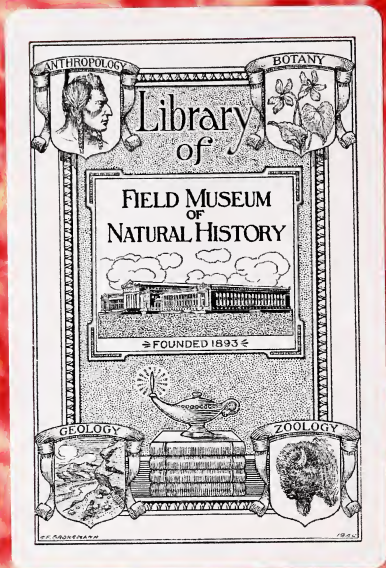
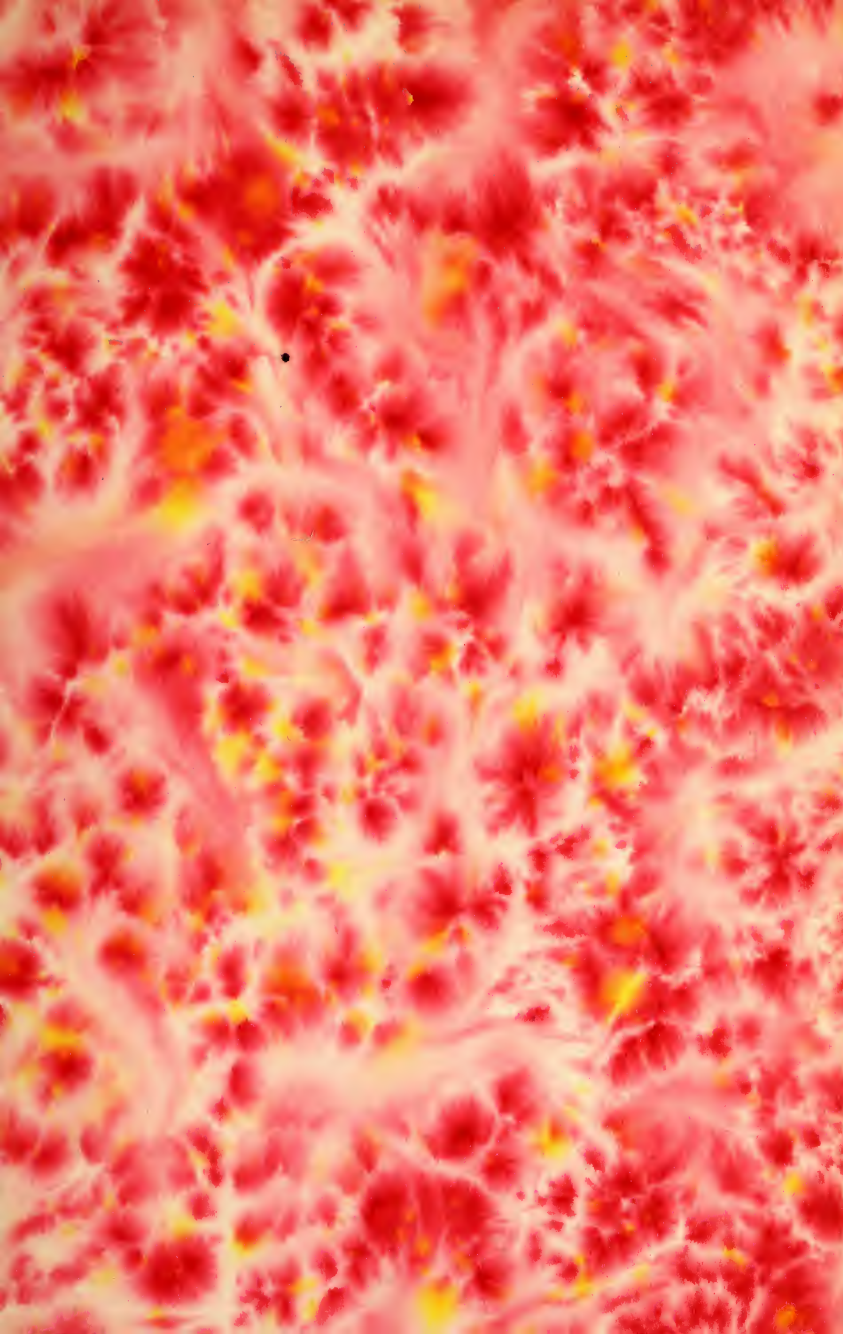


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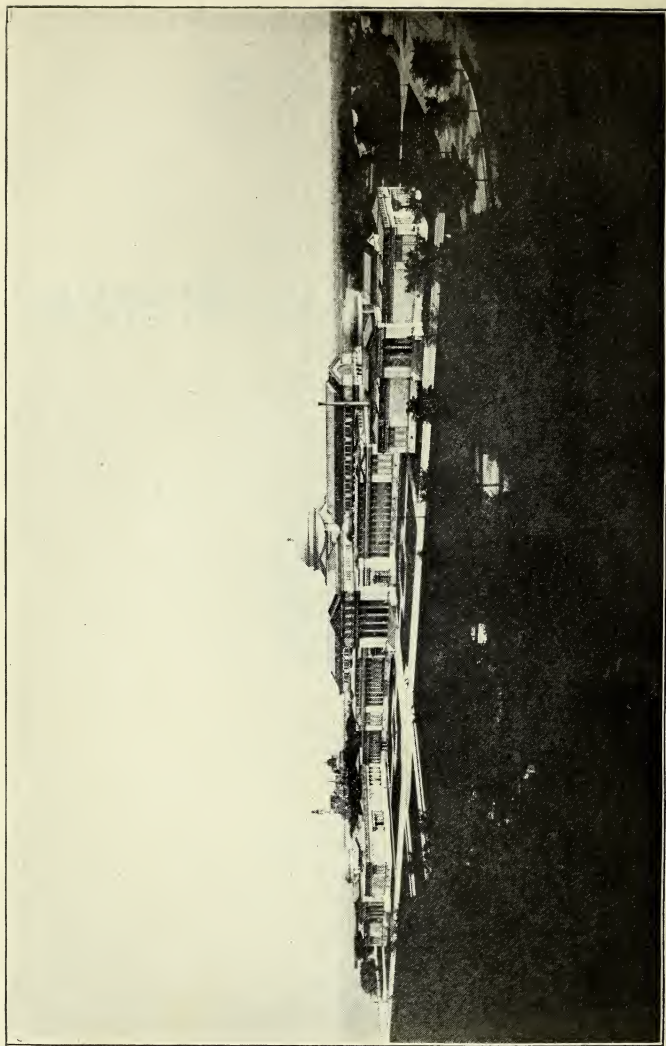
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SIXTH EDITION.

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## INTRODUCTION.

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The Guide locates, by means of plans and numbers, the principal objects of interest in the Halls, Courts, Alcoves and Galleries. The Columbian Rotunda is described first. The Departments are then taken up separately in the order of their usual sequence—Geology, Botany, Zoology, Ornithology, Anthropology and the Transportation collections.

If a general view of the entire Museum is desired, it is suggested that the Departments be visited in the order above indicated. After viewing the Columbian Rotunda (see page 13) the visitor may proceed through the Reading Room and Lecture Hall to the West Pavilion, where are installed the collections of Geology, (see page 17). The Halls should be visited in the following order: 35, 36, and 59—Paleontology; 60 and 61—Geographic Geology; 62, 63, and 64—Meteorites and Mineralogy; 65—Dynamic Geology; 66—Lithology; 67 to 80 inclusive—Economic Geology and Metallurgy.

Returning to the West Court through Hall 35 the Botanical Department may be reached by the stairway in Alcove 102. The circuit of the galleries should be made from the West to the North, then to the East, and finally to the South Gallery. The Botanical collections are arranged on a geographical basis, and begin on the South Gallery with specimens from Asia, Europe, Africa, and follow with the South and North American Series.

After descending to the main floor the visitor may proceed to the south side of the West Court and should visit the Halls of the Zoological and Ornithological Departments.

The Department of Anthropology can be entered from the South Court and may be studied in Halls 10 and 11, devoted to the Eskimo; 12 and 13—the North Pacific Coast; 18—ethnology of the Plains Tribes; 16 and 17—ethnology of the Southwest or Pueblo region; 14 and 15—South American collections. The East

Court contains exhibits relating to the archeology of America. Halls 2 to 9 inclusive, as well as the North Court, are devoted to collections illustrating the anthropology of Europe, Asia and Africa.

The Transportation Collections are located in Halls 37, 38, 39, 40, 54 and 55. Hall 53 contains the initial exhibits of Transportation by Steam which occupies the remainder of the East Pavilion.

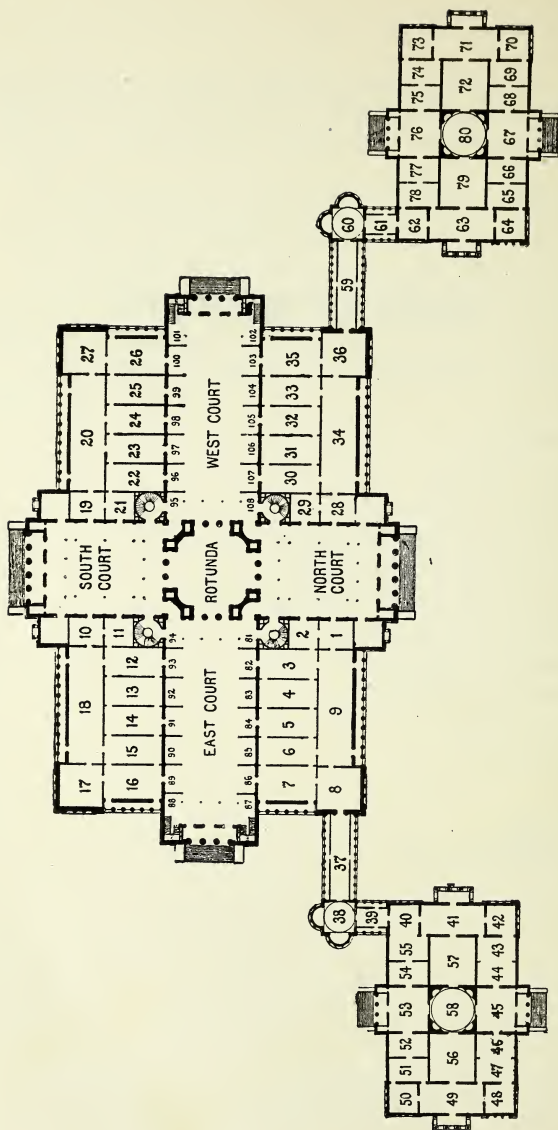
Returning now to the center of the main building, the visitor may examine Musical Instruments in Hall o. Halls 30 and 31 are devoted to Textiles, Gems and Jewels, Hall 32, and Ceramics, Hall 33. (See pages 117, 119, 122 and 127 respectively.)

An account of the Library and Lecture Hall is added. (See page 173. )

## INDEX TO SUBJECTS.

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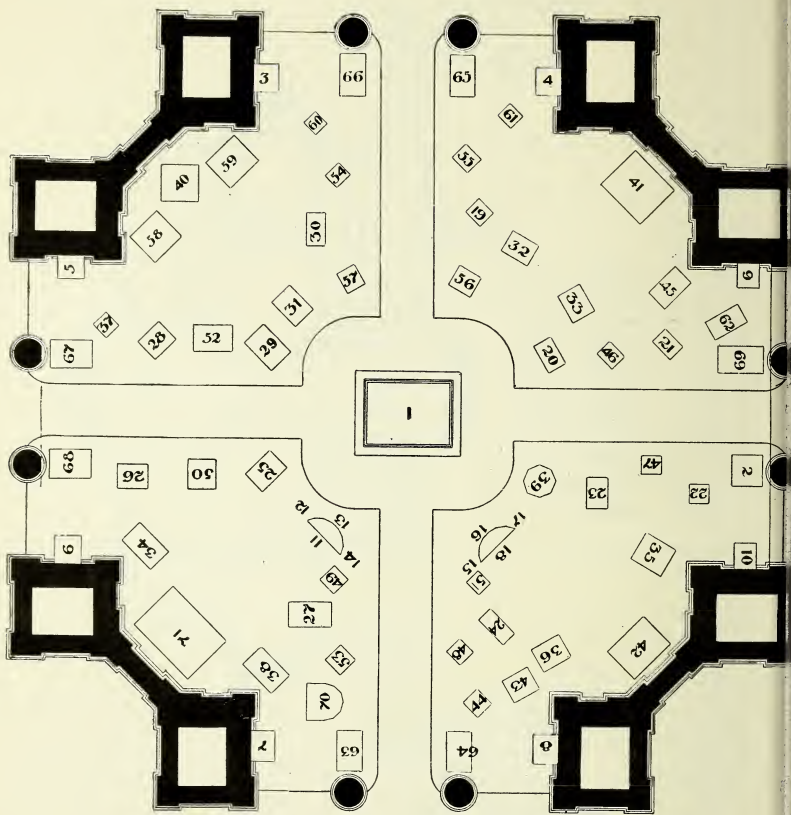
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PLAN OF BUILDING

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Galleries	}	Botany
Halls 37 to 58	}	Transportation
Hall 32	}	Gems and Jewels
	}	"H. N. Higinbotham Hall"



PLAN OF ROTUNDA.



## THE EXPOSITION MEMORIAL.

### COLUMBIAN ROTUNDA.

The Rotunda of the main building of the Museum is devoted to an artistic memorial of Columbus and of the Columbian Exposition. The center-piece—the statute of the Great Discoverer with uplifted sword consecrating the New World—at once attracts attention both as an historical study and as a masterpiece of art. The original sketch models of the figures and groups of figures ornamenting the main Exposition buildings, and donated by the Exposition to the Museum, occupy the entire space around the statue. These models are invaluable as works of modern art, representing the genius of the most talented sculptors of the present day.

In the contracts entered into with the various prominent sculptors they were called upon to furnish what are called “Sketches” of the sculptural decorations, i. e., the models were to be about one-sixth of the full size; from these models the Exposition’s force of sculptors prepared full-size work by enlarging the “Sketches” six times. All the models were first submitted to the architects of the buildings for their approval, in order to harmonize the sculptural decorations with the architecture. The models here shown are the original “Sketches.”

**No. 1.**—Columbus. By Augustus St. Gaudens. This imposing full size statue stood overlooking the Court of Honor at the main portal of the Administration Building. Translation of Latin inscription on pedestal:

“In late years the centuries will come

“When the ocean will loose its fetters

“And the vast earth will lie open,

“And Tethis will disclose new countries.

“When Thule will no longer be the remotest of lands.”

**No. 2.**—Statue of the Republic. By Daniel C. French.

**Nos. 3 to 38.**—Statuary on Administration Building. By Karl Bitter, Sculptor.

- |                        |                |
|------------------------|----------------|
| 3. Water Controlled.   | 21. Education. |
| 4. Water Uncontrolled. | 22. Truth.     |
| 5. Fire Controlled.    | 23. Strength.  |
| 6. Fire Uncontrolled.  | 24. Liberty.   |
| 7. Earth Controlled.   | 25. Charity.   |
| 8. Earth Uncontrolled. | 26. Abundance. |
| 9. Air Controlled.     | 27. Theology.  |
| 10. Air Uncontrolled.  | 28. Diligence. |
| 11. Goddess of Fire.   | 29. Joy.       |
| 12. Fisher Maiden.     | 30. Unity.     |
| 13. Bather.            | 31. Strength.  |
| 14. Diana.             | 32. Peace.     |
| 15. Air.               | 33. Religion.  |
| 16. Harvest Girl.      | 34. Industry.  |
| 17. Blacksmith.        | 35. Art.       |
| 18. Flower Girl.       | 36. Commerce.  |
| 19. Patriotism.        | 37. War.       |
| 20. Tradition.         | 38. Justice.   |

**Nos. 39 to 45.**—Sculpture Work on Agricultural Building. By Philip Martiny.

- |                   |                  |
|-------------------|------------------|
| 39. Four Nations. | 42. Horse Group. |
| 40. Four Seasons. | 43. Ceres.       |
| 41. Cattle Group. | 44. Zodaic.      |
| 45. Victory.      |                  |

**Nos. 46 to 51.**—Figures of Inventors. Sculpture Work on Machinery Hall. By Robert Kraus.

- |               |                 |
|---------------|-----------------|
| 46. Galvane.  | 49. Ericsson.   |
| 47. Whitney.  | 50. James Watt. |
| 48. Daguerre. | 51. Senfelder.  |

**Nos. 52 to 57.**—Six figures on Machinery Hall. By M. A. Waagen.

- |              |              |
|--------------|--------------|
| 52. Science. | 55. Fire.    |
| 53. Earth.   | 56. Air.     |
| 54. Water.   | 57. Victory. |

**Nos. 58 and 59.**—Sculpture on Colonnade, by M. A. Waagen.

- |                  |                   |
|------------------|-------------------|
| 58. Horse Group. | 59. Cattle Group. |
|------------------|-------------------|

**Nos. 60 and 61.**—Electricity Building.

60. Electrification, by I. A. Blankinship.

61. Experimental Electricity, by N. A. McNeil.

**No. 62.**—Sculpture Work on Lagoons.

62. Lion at Base of Obelisk, by M. A. Waagen.

**Nos. 63 to 66.**—Sculpture Work on Boat Landings. By D. C. French and E. C. Potter.

63. Industry (Horse).

65. Wheat (Bull).

64. Sloth (Horse).

66. Indian Corn (Bull).

**No. 67 to 69.**—Sculpture Work on Bridges of Lagoons. By Edward Kemeys.

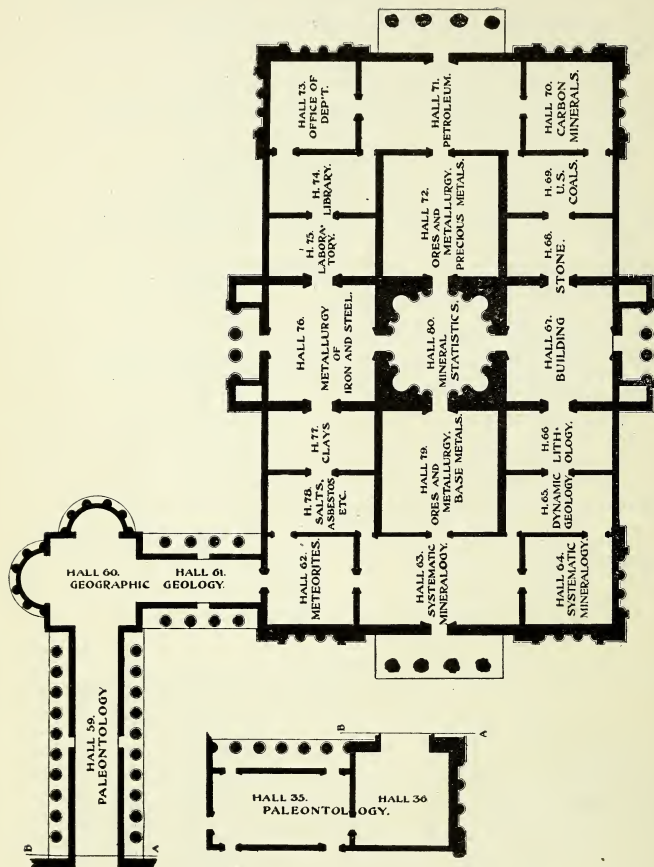
67. Buffalo—Male.

68. Buffalo—Female.

69. The Still Hunt.

**No. 70.**—Glorification of Discovery. By Cratt.

**No. 71.**—The Columbus Quadriga. By French and Potter.  
This crowned the arch of the Peristyle.



PLAN OF DEPARTMENT OF GEOLOGY



## DEPARTMENT OF GEOLOGY.

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The collections gathered in the Department of Geology are designed to illustrate the history of the earth's development and the materials which form its crust.

Since, moreover, the science of geology has both a theoretical and a practical side, a division of the collections has been made in order to present these two phases of the subject. Those illustrating geology as a theoretical science are to be found in the Division of Systematic Geology; those showing it in its relations to human arts and industries, in the Division of Economic Geology.

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### DIVISION OF SYSTEMATIC GEOLOGY.

This division comprises six sections, located as follows:

Paleontology: Alcove 103, Halls 35, 36 and 59.

Geographic Geology: Halls 60 and 61.

Meteorites: Hall 62.

Systematic Mineralogy: Halls 63 and 64.

Structural and Dynamical Geology: Hall 65.

Lithology: Hall 66.

These sections illustrate in order, first, the life of the globe from its earliest beginnings to its latest and highest forms; second, the configuration and mode of formation of the surface of the earth; third, the bodies which come to us from regions outside the earth and which furnish the only material sources from which we can learn the composition and structure of the heavenly bodies; fourth, the component minerals of the earth's crust, classified according to their chemical composition; fifth, the aggregates of these into rocks, and sixth, the effects produced by physical forces in forming and shaping the materials of the crust.

The arrangement of specimens under each section follows that of some standard text-book on the subject, so that each section may be considered as illustrative of such text-books, or on the other hand these may be referred to for a fuller description of the specimens or discussions of the subjects presented.

## HALLS 35, 36, AND 59. ALCOVE 103.

## PALEONTOLOGY.

In the Section of Paleontology it is sought to illustrate by fossils, casts and models, the animal and vegetable forms which have characterized the life of the globe at the succeeding stages of its history. The arrangement is primarily chronological, and secondarily zoological, and the order to be followed in a study of the collections is indicated by the numbering of the cases. Passing from left to right, as one would do in reading a book, the collection may not improperly be regarded as a book describing the history of the earth from the dawn of life to the present time, though the characters in which it is written are rock specimens instead of printed letters. The series begins in Hall 35, at the left of the entrance from the West Court, passes along the west wall, the south wall of Halls 36 and 59, then to the other side of the same rooms, and back to the right of the entrance to Hall 35. The larger specimens in the center of the halls it was impracticable to place in chronological order, but the specimen labels show the period to which each belongs. All the specimen labels show: 1st, the name of the species, together with that of the authority by whom named; 2nd, the geological period or epoch to which each belongs; and 3rd, the locality. Wherever a cast is shown, the fact is indicated by the label, so that it may not be confounded with original specimens.

Under each period the specimens will be found arranged in accordance with their zoological rank, beginning with the lowest. Plants are placed first; then in order, Protozoans, Radiates, Mollusks, Articulates and Vertebrates.

The visitor will find it interesting to note the characteristic forms of life of the different epochs, and the increase in number and variety of species as the earth's history advanced.

A large chart upon the wall of Hall 35 shows the order of succession of the geological periods as they are known by name and will be found convenient for reference in order to determine the chronology of the different periods.

**Alcove 103.**—Two large blocks, one of limestone from Kelley's Island, Ohio, the other sandstone from North Amherst, Ohio. These illustrate glacial scoring and polishing.

There are also shown a section of a large specimen of *Arietites*, a mollusk allied to the modern Nautilus and tracks of reptiles of the Triassic period, on sandstone from Turner's Falls, Mass.

The model of the moon shown in this alcove is described under Geographic Geology, p. 37.

**Case 1A, Hall 35.**—Fossils of the Laurentian period. The existence of life at this period has not been definitely proved by any remains found as yet. A supposed fossil, *Eozoon Canadense*, is illustrated by several specimens.

The specimens are made up of alternate layers of calcite and serpentine, which are thought by some to represent the shell and body cavity of an ancient, huge Rhizopod. Others regard the masses as of wholly inorganic origin.

**The remainder of Case 1 and Cases 2A-F.**—Fossils of the Silurian age or age of Invertebrates. The life of this age is almost wholly marine and made up chiefly of corals, crinoids, brachiopods and mullusks. It is illustrated in the collection according to periods as follows:

**Case 1, A and B.**—Cambrian and early Silurian fossils. *Oldhamia*—probably a plant of the order of marine algæ; *Brachiospongia*—a representative of the class of sponges; *Monticulipora*—of corals.

*Diplograptus*, *Tetragraptus*—Hydroids known as graptolites, abundant fossils of this era. The name is derived from the Greek word meaning "to write," and refers to the plume-like nature of their remains. *Scolithus*—supposed to represent the borings and tracks of worms.

*Tentaculites*—minute mollusks of the class of Pteropods. *Conularia*—perhaps also Pteropods.

*Paradoxides*, *Asaphus*, *Olenellus*, *Agnostus*—Trilobites, the most common and characteristic fossils of early Silurian times. They were crustaceans, allied to the horse-shoe or king crabs of the present day. Two models illustrate the various parts of their structure, and tracks of a trilobite, genus *Climatichtnites*, are shown on a large slab of sandstone from Wisconsin. The number of important animal types having existence in even the earliest geological periods is worthy of note.

Between Cases 1 and 2, a cast of an *Orthoceras*, nine feet in length. This shows the size which these Cephalopods, repre-

sented at the present time by the nautilus, attained in early times. They were a striking feature of the Palæozoic era.

**Case 2A.**—Trenton and Cincinnati epochs. *Receptaculites*, *Selenoides*—probably calcareous sponges. *Favistella*—Corals belonging to the family Favositidae or honey-comb corals, so called because made up of hexagonal, parallel columns. *Orthis*—a genus of the class of Brachiopods, characteristic of this epoch.

Brachiopods are sometimes called lamp shells, on account of their resemblance to a Roman lamp; the two valves of the shell are unequal in size, and the beak of the larger curls over on that of the smaller. Though found only in small numbers at the present day, they were in Silurian times the most abundant and characteristic form of marine life. In structure they have points of alliance with the Worms on the one hand and with Mollusks on the other. *Pleurotomaria*, *Murchisonia*—Gasteropod or univalve Mollusks common in the Trenton epoch.

**Case 2B.**—Hudson river and Medina epochs. Brachiopods are represented by large slabs containing *Leptoena*, also many species of *Lingullela*, *Lingula* and *Rhynchonella*. Species of the two latter genera exist at the present day. They afford a remarkable example of the power of a genus to survive the vicissitudes of time. *Glyptocrinus*, *Iocrinus*—Crinoids, the class of Echinoderms most abundant in early times. Attached by jointed stem and bearing many-branching arms, they have been appropriately termed sea-lilies.

*Arthrophecus*—supposed to represent the leathery stems of seaweeds. Some authorities, however, regard this fossil as representing the markings of worms.

**Case 2C.**—Hudson river and Niagara epochs. *Eridophyllum*—Corals of the Cyathophylloidea or cup-coral family. *Halyssites*—Corals of the Halysitidae or chain-coral family. Nearly all Silurian corals belong to these two or the Favositid family.

*Streptorhynchus*—A representative Brachiopod. *Orthoceras*—many specimens illustrating the size and distribution of this Silurian Cephalopod.

The several sections show that its shell was divided by cross partitions into chambers. The animal occupied only the end chamber, but a long tube or siphuncle connected the others to its body.

**Cases 2D and E.**—Niagara and Lower Helderberg periods.

*Favosites*, *Halysites*—Corals. *Eucalyptocrinus*—Crinoids. *Illæ-nus*—Trilobites. *Bythotrephis*—probably marine Algæ. *Pentamerus*—a large and abundant Brachiopod, characteristic of the Niagara beds of the Mississippi Basin. *Spirifer*, *Rhynchonella*—other common Brachiopods. *Eurypterus*—Crustaceans closely allied in structure to modern Scorpions, but being water breathers are classed with the Crustacea. A large number of specimens from the Water-lime group of New York.

**Case 2F.**—Foreign Silurian fossils. From the Wenlock limestone of England, several specimens of *Periechocrinus*, *Cyathophyllum* and others. From the Bohemian beds, several species of Graptolites, the genera *Phacops* and *Dalmanites* among Trilobites, and many specimens of the *Orthoceras* family.

**Floor Case A.**—Fossils of the Chicago Basin. These occur in limestone of the Niagara epoch and have been collected at various quarries in the vicinity of Chicago, including the Chicago Drainage Canal. They are chiefly of the groups of crinoids, orthoceratites and trilobites.

**Case 2G, H and 3.**—Fossils of the Devonian Age or age of fishes. The fishes which by their size and abundance characterized this age, belonged to two orders—Ganoids, represented at the present day by the garfish and sturgeon, and Placoids, the order which includes sharks, skates and rays. They differed in many respects from the fishes of the present day, however. The Ganoids were covered with thin, bony scales, had teeth of reptilian character and jointed, paired fins. The Placoids had cartilaginous skeletons, no scales, no gill covers, and many of their characters were embryonic.

**Case 2G.**—Lower Devonian fossils of the Corniferous period. *Favosites*—Honey-comb corals. *Heliophyllum*—Cup corals.

*Ophiura*, *Loriolaster*—Asteroids similar to modern starfishes. Being free-moving Echinoderms, they mark the introduction of a higher type than the attached Crinoids. *Macropetalichthys*—a Ganoid fish.

**Case 2H.**—Lower Devonian fossils. *Syringopora*—Chain corals. *Zaphrentis*—common and characteristic cup corals. *Orthis*, *Atrypa*, *Spirifer*—Brachiopods. *Coccosteus*—a typical Ganoid from the Old Red Sandstone of Scotland.

**Case 3A.**—Middle Devonian fossils. *Psilophyton*, *Sphenopteris*, etc.,—early land plants from the Devonian beds of St.

John, N. B. They were of low orders, chiefly mosses and ferns. *Holoptychius*, *Glyptolepis*, *Diplopterus*—fishes from the Old Red Sandstone of Scotland. These are nearly all Ganoids, as may be seen from the large, bony scales with which they are covered. *Cyathophyllum*, *Cystiphyllum*. *Zaphrentis*—Cup corals.

**Case 3B.**—Upper Devonian fossils. Large, polished masses of *Acerularia* from Iowa, a honey-comb coral. *Dictyophyton*—belongs to the class of sponges. *Aspidosoma*, *Furcaster*—Asteroids. *Spirifer*, *Orthis*—Brachiopods. *Goniatites*—represents the Cephalopods. They are of the same type as *Orthoceras*, but are coiled and the junction of the septa and shell (suture) is zigzag instead of straight. *Bothriolepis*—Ganoid fish. Note the thick, bony plates or armor.

**Floor Case B.**—Fossils of the Hamilton Group (Devonian) from Hockberry Grove, Iowa beds and Millwaukee, Wisconsin beds. Collection of Carboniferous fossils from Mazon Creek, Ill. Gift of J. C. Carr, Esq.

Collection illustrating methods of petrification and preservation of fossils. Here it will be seen that the common notion that animals and plants can petrify or turn to stone entire is quite erroneous. Fossils are chiefly of the nature of hard parts, such as bones or shells of animals, preserved, or are natural casts of their form.

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## HALL 36.

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**Cases 4A, 4B, 4C, 4D and 5A.**—Fossils of the Carboniferous Age, or age of coal plants. Naturally, land plants are the striking features of this age. They belong to five great families. Conifers, Ferns, *Lepidodendrids*, *Sigillarids*, and *Calamites*.

*Cordaites*. This tree is allied to the Conifers, and had, probably, a straight trunk 60 or 70 feet in height. *Trigonocarpum*, in the same case, is supposed to represent its fruit. Ferns are represented by *Pecopteris*, *Neuropteris* and others, many imprints of sections of the fronds being shown. These frequently form the center of clay concretions, as may be seen in some which have been broken open. Sections of trunks of *Lepidodendrids* and *Sigillarids*. One of the latter shows by its size that the trunk of the original tree must have been many feet in diameter, and perhaps 80'

to 100 feet high. *Stigmara*, probably represent the under-water stems of the Sigillarids.

The animal life of this period is characterized by the abundance of Crinoids. These reached their highest development at this time. Many specimens are shown in this case, including *Platycrinus*, *Scaphocrinus* and *Pentremities*, the latter a Blastid or bud crinoid. Corals were also abundant, as represented by the columnar *Lithostrotion*, a true polyp coral, and *Dibunophyllum*, a cup coral. The cork-screw-like Bryozoan *Archimedes* is illustrated by several specimens. *Spirifer* and *Productus* are the leading genera among the Brachiopods. The Gasteropods, uni-valve mollusks, are represented by *Bellerophon* and *Pleurotomaria*. *Melonites*, in the upper part of Case 4, was an Echinoid allied to the sea-urchin of the present day; it differs from the latter, however, in having large plates and small spines. A cast on the wall shows the foot-prints of one of the first reptiles, *Sauropus*. It was a four-footed, crawling animal, with thick, fleshy feet about four inches long.

**Case 5A, Hall 59.**—Permian, or closing age of the Carboniferous. Fishes are represented by the *Palæoniscus*. Reptiles by the *Archegosaurus*, an animal which combined the characters of reptile and fish, having both lungs and gills, and being covered with scales. Plants are represented by leaves of the *Walchia*, a Lycopod.

**South and West Walls of Hall 36.**—Large slabs and casts showing tracks of reptiles of the Triassic period. Little is known about these animals, except so much as can be learned from their foot-prints. The *Brontozoum* was a three-toed animal, probably at least 14 feet in height, with a stride of over 3 feet. *Cheirotherium* (South Wall, Hall 59,) was so named from the resemblance of the foot-print to the human hand. It was a four or five-toed reptile, probably of the order of the Labyrinthodonts. A cast showing the shape of the skull of the latter animal may be seen at the right.

**Cases 5, 6, 7, part of 8 and Walls of Hall 59.**—Fossils of Mesozoic time, the age of reptiles. This age is characterized by the number and size of its reptiles, especially Amphibians. Here, too, are introduced the first mammals, birds and fishes of the modern type, and among plants the *angiosperms*.

**Cases 5A and B.**—Triassic fossils. Many types of the Carboniferous Age continue to be prominent. *Equisetum*, belonging to the family of Equisetæ, or "Horsetails" of the present day, and *Pterophyllum*, of the order of Cycads, were most prominent among the land plants, and are illustrated by many specimens. Among the Lamellibranchs, the modern genus of *Modiola* is introduced. *Ceratites* represents the *Orthoceras* of early times from which it will be seen to differ in being coiled, and in having a more complex suture.

**Cases 5C, D, E, F, G, 6, 7, 8A, B, C, D and Walls of Hall 59.**—Jurassic fossils.

This is the period when the class of reptiles reached its greatest development. Other interesting fossils which are found, may, however, be first noticed.

**Cases 5D, E, F, G.**—Among plants, Cycads are illustrated by several specimens of *Cycadoidea*. Among Invertebrates the beautiful Crinoid *Pentacrinus*, illustrated by three specimens on the south wall, is especially notable. Other Echinoderms are *Cidaris*, *Hemicidaris*, *Pygaster* and *Clypeaster*, the two latter being allied to *Clypeus* or "sand dollar" of the present day.

Brachiopods, mostly of the sloping shoulder type, are illustrated by the genera *Terebratula* and *Rhynchonella*. Among bivalve mollusks the introduction of the modern genus of *Ostrea* or oyster, is notable. A large number of beautifully preserved remains from the lithographic slate beds of Solenhofen are shown. They include some of the earlier Insects, and Crustacea resembling the modern lobster and king crab, *Limulus*, *Æger*.

**Case 6.**—Ammonites, remarkable for size and complexity of suture. Many specimens are shown, including the genera *Cardioceras*, *Arietites*, *Grammoceras*. Some of the *Arietites* are 3 feet in diameter. The sutures of some specimens have been painted to bring out the markings. Many specimens of *Nautilus* and allied Cephalopods.

**Case 7.**—*Belemnites*. These are allied to modern Cuttlefishes and Squids. The only part of the animal usually preserved is the internal bone, or pen. Two restorations of the original animal are shown.

**Cases 8A, B, C, D.**—The *Dinosaurs*, or land reptiles, are illustrated by bones and vertebrae of the *Teleosaur* and casts showing various parts of the *Megalosaur*. *Pterosaurs*, or flying

reptiles, are illustrated by imprints of wings of the *Rhamphorhynchus*, an animal not unlike the bat in appearance, and by casts showing remains of *Pterodactyls*.

**Walls of Hall 59 and Pedestals 1, 2 and 3.**—Remains and restorations of *Ichthyosaur*, *Pliosaur* and *Plesiosaur*, great marine reptiles of the age. The two former often reached a length of 40 feet, had stout bodies, short necks, enormous eyes, long teeth and fin-like tails and paddles. The latter were their organs of locomotion. The huge eyes and teeth indicate that they were predatory and voracious animals, their food being probably fishes and other reptiles.

The Plesiosaur was a smaller and more graceful animal, with long neck, small head and powerful paddles, but in habits similar to the preceding. All had many fish-like characters.

**Floor Cases A, Hall 59 and A, Hall 36.**—Bones of the Dinosaurs or "terrible lizards" which inhabited Wyoming in Jurassic times. These have been collected by Museum Expeditions. The bones illustrate the great size which these reptiles obtained. One thigh bone is nearly six feet long, and weighs 500 pounds, and one shoulder blade is  $5\frac{1}{2}$  feet long and weighs 400 pounds. The animal of which these bones constituted the frame work must have been 70 feet long and have stood 18 feet high. Such animals are the largest land animals ever known to have existed.

**Cases 8E, F, G and 9.**—Fossils of the Cretaceous period.

**Case 8E.**—Here we find the first of modern plants, or *Angiosperms*. Imprints of leaves are shown, many being modern genera, such as *Sassafras*, *Populites*, or poplar, *Betulites*, or birch, and *Viburnum*.

**Cases 8F and G.**—Among bivalve mollusks the order of *Rudistes* is unique, and characteristic of this period. In shells of this order one valve is enormously enlarged, and somewhat funnel-shaped; the other valve is small and acts as a lid—*Hippurites Sphærulites*, *Radiolites*. *Inoceramus* also belongs to this order, and sometimes reaches enormous size.

Casts, much enlarged from the original, illustrating the forms of *Foraminifera*, whose shells make up the vast deposits of chalk which characterize this period.

**Case 9, Hall 36.**—Among Echinoids, the free moving forms are vastly in excess of the stemmed—*Ananchytes*, *Holaster*, and *Toxaster*. Among Cephalopods are specimens of *Nautilus* of

modern type; also members of the *Ammonite* family, which take on various and intricate forms. The series of *Placenticeras*, Ammonites with coiled shells often two feet in diameter, is especially worthy of note. The specimens are chiefly from the Bad Lands of South Dakota. Many varieties of shape are found among the Ammonites, from straight shelled to hook-shape, partly uncoiled spirals, spirals, etc. The genera are often named from their characteristic forms, some of them being as follows: *Baculites*, rod-shaped; *Hamites*, hook-shaped; *Helicoceras* an open spiral; *Scaphites*, boat shaped; *Turritiles*, tower-shaped.

Agassiz describes these forms as representing the death contortions of this remarkable family. It is true that with this age this group, which had so long been one of the dominant types of marine life, became extinct, but the forms show progression up to the time of extinction, and not degeneration.

*Lamellibranchs* and *Gasteropods*, illustrated by many specimens, mostly of modern types—*Ostrea*, or oyster, of many and curious shapes; *Pecten*, *Vola*, *Exogyra*, *Gryphæa*, etc.

Fossil leaves from the Upper Laramie beds of Golden, Colo. These are of deciduous trees of modern type, such as poplar and oak; also the fig.

The vertebrates of the period are represented by a tail of *Xiphactinus* and fin of *Pelecopteris* huge, carnivorous fishes, and by a skull of *Liodon*, a carnivorous sea lizard. All of these inhabited the Cretaceous seas of Kansas. Casts show the remains of a *Mososaurus* from Holland, a sea lizard probably 80 feet in length, and of *Hesperornis*, one of the earliest birds.

**Cases 9F, 10, and 11.**—Fossils of Cenozoic time, or age of mammals, divided into the Tertiary and Quarternary periods.

**Cases 9F, 10 and 11A and B.**—Tertiary fossils.

**Case 9F.**—*Flabellaria*, leaves of a palm which grew in the Eocene epoch near Green River, Wyoming. Also, leaves of *Acer*, or maple, and other trees of modern species.

Such remains, with others that are found, indicate that a sub-tropical climate, like that of Florida, prevailed at this period over the Northern United States. Even as far north as Greenland, the climate was so mild that cypress and cedar trees grew in profusion.

*Nummulites*.—These are abundant and characteristic fossils of this period. They are shells of a Rhizopod, which in Europe and Africa form limestones many thousand feet in thickness.

**Case 10.**—Among univalve mollusks many modern types will be recognized—*Turritella*, *Natica*, *Cerithium*, *Strombus*, etc.

Fishes belonging to the order of *Teleosts*, or osseous fishes, are illustrated by many specimens from the Green River, Wyoming beds—*Priscarare*, *Diplomystus*, etc. These are of modern types and related to the perch, herring and the like. The series here shown is especially large and fine.

Sharks of enormous size existed as shown by teeth of the *Carcharodon* may be seen in this case.

**Floor of Hall 36, Pedestal 1.**—A restoration showing the jaws of *Carcharodon*, and within these, for comparison, the jaws of a modern shark. The ancient *Carcharodon* was probably 50 to 70 feet in length.

**Pedestal 2.**—Restoration of *Hadrosaurus* from the Upper Cretaceous of New Jersey. This was a huge land reptile, 28 feet in length, allied to the *Iguanodon*. It was probably a vegetable feeder, and able to stand and walk after the manner of birds.

**Pedestal 3.**—Restoration of a skeleton of *Dinoceras*. This was a five-toed Ungulate of elephantine size, but had no proboscis, and was probably like the rhinoceros in its habits. It is marked by three pairs of protuberances on its skull which probably bore horns. In spite of the size of the animal its brain capacity was very small—only one-eighth that of a modern horse, as shown by a cast, Case 11D.

**Pedestal 4.**—Head of *Dinotherium* (cast). This was a huge animal with a skull three feet long, herbivorous, and remarkable for two long tusk-like teeth, projecting downwards. It combined the characteristics of the elephant, hippopotamus tapir and dugong.

**Pedestal 5.**—A restoration of the skull of *Elephas ganesa*, one of seven species of elephants existing during the Miocene epoch in India. This species is remarkable for the length of its tusks, in this specimen ten feet long.

**Pedestal 6.**—Complete skeleton of *Mastodon* from Southern Michigan. This was the earliest of elephant-like mammals, differing from the elephant in having a more elongated body, shorter and stronger limbs, flatter cranium and less complex molars. The grinding surfaces of the molars were more or less tubercular, in contrast to the ridges which characterize the teeth of the elephant. Hence comes the name, mastodon—*nipple tooth*.

The animal probably had no hairy covering to enable it to endure a rigorous climate as did the mammoth. It inhabited chiefly the temperate regions of the United States, where its remains are found in abundance.

**Pedestal 7.**—Skeleton of the *Irish Deer*, from Limerick, Ireland—a Post-Pliocene deer of a great size, the bones of which are found in marl beneath peat beds in Ireland and England. The antlers of this animal have a spread of seven feet, and its height was nearly eight feet.

**Floor Case A.**—Bones of fossil reptiles of Wyoming. Described under Jurassic fossils p. 25.

**Floor Case B.**—Skull of *Titanotherium ingens*. Collected in the Bad Lands of South Dakota by the Museum Expedition of 1898. This is one of the largest and finest *Titanotherium* skulls ever found. The animal was somewhat rhinoceros-like in its habits and in size probably reached a length of fourteen feet and height of eight feet.

**Case 11.**—Complete series of cervical vertebrae except the atlas, and five dorsal vertebrae of the *Titanotherium* individual whose skull is shown in Floor Case B.

The long spinous processes show that the creature had a large hump over the fore limbs caused by the development of muscles required to support the heavy skull.

Other *Titanotherium* bones. Skulls of *Mesohippus*, *Leptomeryx* etc., mammals more or less contemporaneous with the *Titanotherium*.

**Hall 35. Case 12.**—Group of *Daemonelix* or "Devil's Corkscrews." Series showing probable development of *Daemonelix*. *Daemonelix* is found in great quantities over the plains and among the strata of Northwestern Nebraska. Their exact nature is problematical but the most probable view is that which considers them fossil aquatic plants. According to another theory they are casts of ancient mole burrows. The series shown is thoroughly representative.

**Case 13 A.**—Vertebrate fossils of the Tertiary period. Fossil turtles shown, include many carapaces from Nebraska, South Dakota, and South Carolina; also turtle eggs from France.

The *Cetacea*, or whales, of this period, are illustrated by vertebrae of the *Zeuglodon*. These animals were probably seventy

feet in length. Their bones are so common in many places in the South as to be used by farmers for building fences.

The earliest mammals of the period, those of Eocene age, are illustrated by specimens and casts of fossils from the Paris basin.

The mammals of the White River beds of South Dakota of miocene age are illustrated by teeth, skulls and other bones of *Oreodon*, *Mesohippus*, *Elotherium*, *Dinictis*, etc. The *Oreodon*, whose skulls occur in great abundance in the Bad Lands of South Dakota may be described as "a ruminating hog" since it combined character of the hogs and ruminants. It was probably about the size of a sheep.

The *Elotherium* was also a large hog-like animal of active habits. An exceptionally fine skull is shown.

Skull of *Titanotherium tichoceras* a different species from that shown in Hall 35.

Vertebrate fossils of the miocene beds of the Sewalik Hills, India, are represented by numerous casts.

Cast of skull and limb bones of *Diprotodon* a huge, ancient kangaroo.

**Case 13 B.**—Fossils of the Quaternary Period. Invertebrates are illustrated by large shells of *ostrea* or oyster, now extinct, from North Carolina. Also by numerous specimens from Quaternary clays of Europe.

Among vertebrates should be noted the series of teeth of the *Mammoth* and *Mastodon*. Teeth of the Mammoth are shown from Texas, Idaho, San Salvador and Alaska. These indicate the wide range of this animal.

Note the great number of cross ridges in the teeth of the Mammoth and the tubercular surface of the teeth of the Mastodon. The latter indicate that the movement of the jaw of the Mastodon was vertical like that of carnivores, rather than lateral, like that of herbivores in general.

Limb bones and hair of the Mammoth from Alaska and Siberia. Limb bones and teeth of hippopotamus and bison from England showing that these animals lived in England in comparatively recent times. Limb bones and casts of eggs of *Eurypteryx*, and *Mesopteryx* and others of the huge birds which inhabited New Zealand until very recent times.

Skull of *Ursus spelaeus* or cave bear. This was a bear of

great size, frequently not less than nine feet in length, the remains of which are found in Europe in caves with human bones. It was evidently contemporaneous with early man, but has been extinct since historical times.

Remains of *Homo sapiens*, or man, found in a cave on the island of Crete—probably very ancient. Casts of the Neanderthal and Engis skulls, the former of which has given rise to much discussion because of its flattened form. This has been held by some to prove that early man was a being intermediate between man and the ape. The skull has, however, about the average human brain capacity.

The advent of man marks the end of geological life history and the study of subsequent life belongs to the sciences of botany, zoology and ethnology.

**Pedestal 1. South Wall.**—Casts of skulls of *Toxodon*, *Tinoceras*, *Sivatherium* and *Nototherium*. Limb bones of *Sivatherium* and *Palaeopteryx*.

The *Toxodon* was a quadruped of huge size, which combined characters of rodents, elephants and whales. Its teeth show it to have been an herbivorous animal and its habits were probably like those of the Manatee or sea cow.

The *Nototherium* was an Australian mammal, of the wombat type, though as large as the rhinoceros. It probably had some of the characters of the elephant, and was closely allied to the *Diprotodon*. The humerus indicates that it was a burrowing animal, but it is hard to understand how an animal of so great size could have been of such habit.

The *Tinoceras* was allied to the *Dinoceras*, Hall 36. The *Sivatherium* was a four-horned antelope or giraffe of elephantine size.

The *Palaeopteryx* was a huge, ancient bird.

**Floor of Hall 35, Pedestal 1.**—Restoration of *Glyptodon clavipes*. This was a giant Edentate, allied to the Armadillo. It existed during Quaternary times in South America. The specimen is 10 feet in length, its carapace having a length of 5 feet.

**Pedestal 2.**—Restoration of *Megatherium Cuvieri*. This was another South American Edentate of the Quaternary epoch, which had one hundred times the bulk of any living species of this order. The genus had a wide range during this period, as shown by its bones being found as far north as South Carolina. It

was a huge, clumsy beast, its enormous femur, three times as thick as an elephant's, being used for supporting the animal while with its fore limbs it tore down branches of trees for food.

**Pedestal 3.**—Restoration of *Colossochelys atlas*, one of the huge turtles of the Tertiary period.

**Floor Case C.**—Complete skeleton of *Dinornis*, a cursory bird of great size and strength, which lived till recently in New Zealand, but has now become extinct.

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## HALLS 60 AND 61.

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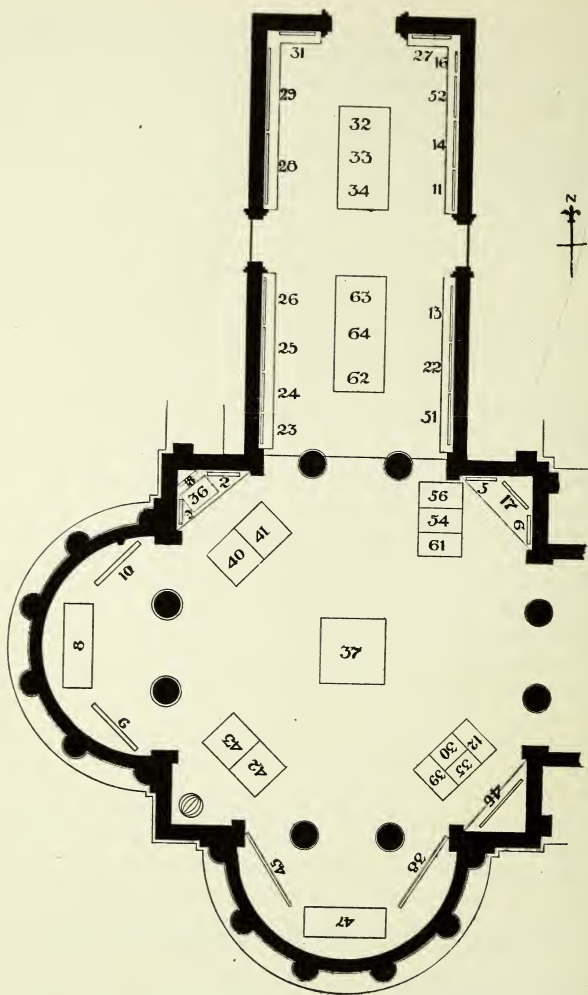
### GEOGRAPHIC GEOLOGY.

The purpose of this collection is to illustrate in a vivid and realistic way the surface configuration of the earth. The chief feature of the exhibit is a series of relief maps which reproduce on as natural and representative scales as practicable, the topography and structure of selected portions of the earth's surface. A part of the series show only topography and sculpture, while another part shows geological structure as well as topography. To some extent, the topography is shown on one map and the geological structure on another, so that both elements are represented with the greatest distinctness. The portions of the surface selected to be represented are usually such as to portray some typical form of surface sculpturing or of volcanic accumulation. Some, however, represent natural or political divisions.

In addition to the relief maps, there are models showing geological structure or illustrating methods of development. Some of these are dissected so as to show the more intimate structure of the formations. The exhibit also contains a collection of globes, wall maps, portfolios, and other geographic material. The following is a list of the principal features:

#### RELIEF MAPS SHOWING TOPOGRAPHY ONLY.

**No. 1.**—Relief map of the World on Mercator's Projection. Horizontal scale 630 miles to 1 inch. Vertical scale 78 times the horizontal.



PLAN OF HALLS 60 AND 61.

**No. 2.**—Relief map of Europe. Horizontal scale 85 miles to 1 inch. Vertical scale 45 times the horizontal.

**No. 3.**—Relief map of Asia. Horizontal scale 216 miles to 1 inch. Vertical scale 39 times the horizontal.

**No. 4.**—Relief map of Africa. Horizontal scale 184 miles to 1 inch. Vertical scale 53 times the horizontal.

**No. 5.**—Relief map of North America. Horizontal scale 140 miles to 1 inch. Vertical scale 39 times the horizontal.

**No. 6.**—Relief map of South America. Horizontal scale 147 miles to 1 inch. Vertical scale 30 times the horizontal.

The foregoing maps enable one to study to advantage the great features of continental relief. Among those that may be noted are—that the continents in general have elevated mountain borders and a low or basin-like interior; that the highest border faces the larger ocean; that the lines of greatest elevation are placed outside the center; that all the gentle slopes descend toward the Atlantic and the Frozen Ocean, all the steep ones toward the Pacific and Indian Oceans; that the elevations go on increasing from the poles to the tropics.

**No. 7.**—Relief map of the United States. Horizontal scale 85 miles to 1 inch. Vertical scale 36 times the horizontal.

**No. 8.**—Relief map of the United States and the Gulf of Mexico, modeled on a section of a globe 16½ feet in diameter. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 8 miles.

Note that the true outlines of the continent extend much beyond the present coast line and properly include the West Indies.

**No. 9.**—Relief map of Massachusetts, from maps of the United States Geological Survey and the Topographic Survey of Massachusetts. Horizontal scale, 1 inch equals 4 miles. Vertical scale, 1 inch equals 4,000 feet.

**No. 10.**—Relief map of Connecticut from maps of the United States Geological Survey and the Topographic Survey of Connecticut.

**No. 11.**—Relief map of Northwestern Illinois including Cook, Du Page, Will and eighteen adjoining counties. The course of the Chicago Drainage Canal is shown.

**No. 12.**—Relief map of the Yosemite Valley from surveys made by C. King and J. T. Gardner. Scale, 1 mile equals 4 inches.

**No. 13.**—Relief map of the Yosemite Valley from surveys made by Captain of Engineers, George M. Wheeler, U. S. A. Scale, 1 inch equals 1,000 feet.

**No. 14.**—Relief map of Yellowstone National Park, showing Cañons of the Yellowstone and Madison rivers, etc. Horizontal and vertical scale, 1 inch equals 1 mile, or 1:63360.

**No. 15.**—Relief map of a part of Mount Desert Island, Maine, Scale, 1 to 40000.

**No. 16.**—Relief map of Carmel Bay, California, showing a submarine valley.

**No. 17.**—Relief map of France with detail of post roads and towns. Horizontal scale 1:640,000. Vertical scale 5 times the horizontal.

**No. 18.**—Relief map of the Caucasus Mountains.

**No. 19.**—Elementary relief map of England and Wales.

**No. 20.**—Elementary relief map of Scotland.

**No. 21.**—Elementary relief map of Europe.

**No. 22.**—Relief map of Palestine.

**No. 76.**—Relief map of the Chicago plain.

This has been carefully made from the latest data. It not only shows with great fidelity the present topography of this region but also enables one to trace the successive stages of former Lake Chicago.

#### **Relief Maps Showing Topography and Geological Structure.**

**No. 23.**—Model of Henry Mountains and vicinity, Utah, showing geological formations and the effects of erosion.

**No. 24.**—Model showing Henry Mountains and vicinity ideally restored before erosion took place.

**No. 25.**—Geological and relief map of the Henry Mountains showing the effects of erosion.

**No. 26.**—Same as the above, ideally restored before erosion took place.

The foregoing illustrate the formation of laccoliths or dome-like mountains produced by the intrusion of lava.

**No. 27.**—Relief map of the Uinta and Wasatch Mountains,

colored to show geological formation. Horizontal scale, 1 in. equals 4 miles, or 1:253440. Vertical scale, 1:126720.

**No. 28.**—Relief map of the Grand Cañon of the Colorado and the cliffs of Southern Utah, colored to show geological formations. Horizontal scale, 1 in. equals 2 miles. Vertical scale, 1 in. equals 5,000 feet.

**No. 29.**—Relief map of Eureka District, Nevada, colored to show geological formations. Scale, 1 in. equals 1,600 feet.

**No. 30.**—Relief map of Mount Blanc. Horizontal scale,  $\frac{3}{4}$  in. equals 1 mile. Vertical scale,  $1\frac{1}{4}$  in. equal 1 mile.

**No. 31.**—Relief map of Mount Taylor, New Mexico, showing geological formations. Scale, 1 in. equals 1 mile.

**No. 32.**—Relief model of Leadville and vicinity, dissected to show geological structure. Scale, 1 in. equals 800 feet, or 1:9600.

**No. 33.**—Same as above, undissected.

**No. 34.**—Contour map, in relief, of Washoe mining region, 50 foot contours. Scale, 1:20000.

**No. 35.**—Geological relief map of Blair, Bedford and Huntingdon counties, Pennsylvania. A portion dissected to show geological structure.

**No. 36.**—Profile relief map of the Sentis Mountains, N. W. Switzerland, showing mountain contour and geological structure.

**No. 37.**—Relief map of the high plateaus of Utah, colored to show geological structure. Scale, 1:1680000.

**No. 38.**—Relief map of the Drainage basin of the Arkansas river in Colorado, showing the relations of the catchment basins to the reservoir sites and irrigable lands.

**No. 39.**—Model showing irrigation by ditches and furrows on steeply sloping fields.

**Nos. 40 and 41.**—Relief maps of Mount Shasta showing topographical and geological features.

**Nos. 42 and 43.**—Relief maps of the Chattanooga District showing topographical and geological features. Note how, by folding and erosion, the formations originally overlying one another have been exposed so as to succeed one another laterally.

**No. 44.**—Relief map of New Jersey showing topographical and geological features.

**No. 45.**—Relief map of Kentucky showing topographical and geological features and location of principal coal fields.

**No. 46.**—Relief map of Missouri showing topographical and geological features and principal mining districts.

**No. 47.**—Relief map of the United States showing limits and theoretical curvature of the ancient ice sheet at the stage of the Glacial Period following the main silt epoch. Modelled on a section of a globe  $16\frac{1}{2}$  feet in diameter. Scale, 1 inch equals 40 miles.

#### **Relief Maps of Volcanoes and Volcanic Regions.**

**No. 51.**—Relief map of the region of extinct volcanoes in Auvergne, Central France; geological and topographical. Henri Le Coq and G. P. Scrope.

**No. 52.**—Relief map of the Ice Spring craters, a group of extinct volcanoes near Fillmore, Utah, illustrating the successive formation and partial obliteration of craters and lava fields. Horizontal and vertical scales, 1:1200.

**No. 53.**—Geological relief map of Mount Ætna.

**No. 54.**—Geological relief map of Vesuvius and Monte Somma.

**No. 55.**—Geological relief map of the Island of Palma.

**No. 56.**—Geological relief map of the Island of Teneriffe.

#### **Maps of Ideal Reliefs.**

**No. 61.**—Relief of a volcanic island.

**No. 62.**—Relief of a steep coast and dune coast, showing the two principal types of sea coast as they appear at ebb tide.

**No. 63.**—Relief of a complete glacier.

**No. 64.**—Relief illustrating the formation of valleys by erosion.

#### **Globes.**

Several globes are exhibited, one being 4 feet in diameter.

#### **Wall Maps.**

Among the wall maps shown may be mentioned:

**No. 70.**—Topographic wall map of a portion of the west of Scotland, hatchured. Scale, 1 in. equals 1 mile.

**No. 71.**—Same as above, without hatchures.

**No. 72.**—Bacon's library wall map of London and suburbs.

**No. 73.**—Geological wall map of England and Wales. Scale, 1 in. equals 15 miles.

**No. 74.**—Hotchkiss' geological wall map of Virginia and West Virginia.

**No 75.**—Geological map of Russia.

A complete series of the topographical maps issued by the U. S. Geological Survey is deposited in the Departmental Library, and can be examined on application to the Curator.

#### Relief Map of the Moon.

**Alcove 103.** The relief map of the Moon, Alcove 103, is properly an exhibit under this division. It is a model, in relief, of the visible hemisphere of the Moon, made on a horizontal scale of 1:600,000 and vertical scale of 1:200,000. The hemisphere is 18 feet in diameter. It is much the largest and most accurate work of the kind ever executed.

The division of the moon's surface into plains and mountainous regions is well illustrated also the great size and peculiar characters of the volcanoes.

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### HALL 62.

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#### METEORITES.

The collection of Meteorites includes 224 distinct "falls" or "finds" represented by 4,100 specimens, and having an aggregate weight of 4,720.6 pounds (2,140.4 kilograms.)

These are grouped in three classes, viz.:—Siderites (iron meteorites), Siderolites (iron-stone meteorites) and Aerolites (stone meteorites.) Under each of these divisions the specimens are placed in chronological order, and labels show the locality, date of fall or find, and weight of specimen.

**Case 1.**—*Siderites.* These are meteorites composed chiefly of iron, with varying percentages of nickel, cobalt, manganese, etc. Combined sulphur and phosphorus are usually present. The

surface of the siderites is usually smooth as if fused, and more or less indented or pitted. In the interior they have a silvery luster. Polished slabs, upon etching with acid, usually show regular markings called *Widmannstätten figures*.

According to the character of these figures the siderites are further divided into octahedral and cubic irons and the octahedral irons into those of coarse, medium and fine lamellae. The specimens shown are largely sections from the original masses and most of them polished and etched. The shape of the original mass is often to be seen illustrated by a cast in the adjoining case.

Among the specimens may be noted as of especial interest, the series of Toluca, Mexico, irons, more than twenty masses and slabs being shown. Such masses have been ploughed up at intervals about Toluca since 1784. They long furnished a source of iron to the natives, and one of the specimens shown was once in use as a hammer. The Bemdego, Brazil, iron two sections of which are shown, was also discovered about 1784. It is a mass of great weight. A large series of siderites from Cañon Diablo, Arizona, is shown and some etched slabs. There are also many of the Santa Catharina, Brazil, masses which are much oxidized. These have so high a content of nickel that their meteoric origin has been doubted. Other siderites exhibited in large quantities are the Kenton Co. Ky. 100 lbs., the Floyd County, Virginia, and Ellenboro, N. C., almost entire and Los Reyes, Mexico, entire. *Widmannstätten figures* of great beauty may be noted on the Lion River, Tazewell, Smith Mountain, Carlton and other sections.

**Case 2—*Siderolites*.** These contain metallic and stony matter in about equal proportions and form a transitional group between the siderites and *aerolites*. Frequently the structure is that of a spongy mass of iron, whose cavities are filled with olivine. Specimens from fifteen localities are shown including one complete individual of the Rockwood, Tenn., find.

*Aerolites*. These are meteorites made up largely of stony matter. The surface is usually black, smooth as if fused, and somewhat pitted. On breaking the thin, black crust which covers the exterior, the interior is generally found to be of a grayish color, with scattered metalliferous particles. Analysis shows these meteorites to be made up largely of olivine, enstatite and

other pyroxemes and occasionally feldspar. They have a composition analogous to the most basic volcanic rocks of the earth. The presence of metallic grains is a distinctive feature and serves often as a means of identification. Of special historical interest among the specimens shown are fragments of the Ensisheim aerolite which fell in 1492 and is the oldest meteorite the date of whose fall is known, and of the L'Aigle Stones which fell as a shower of over 1000 individuals in 1803 and convinced scientific men for the first time of the fall of stones from the sky. In large quantity are shown specimens of the fall of Farmington, Kansas, Pultusk, Poland, and Winnebago County, Iowa. Of the latter six hundred and sixty complete individual aerolites are shown. Of remarkable composition is the light colored Bishopville stone, 7 grams of which are shown. It is made up of nearly pure enstatite. Of the rare carbonaceous meteorites are shown specimens of Orgeuil, Mighei and Alaie.

**Cases 5 and 6.**—Siderolites, from Kiowa county, Kansas. Found in 1889. The mass in Case 5 weighs 465 pounds; the largest in Case 6, 344.5 pounds. There are also three smaller masses, and three or four slabs cut to show the structure of the iron, the cavities of which will be seen to be filled with olivine.

**Case 8.**—Aerolite from Long Island, Phillips County, Kansas. This is the largest single aerolite yet known. The mass struck a ledge in falling and was broken into 2,934 pieces. The aggregate weight of these is 1184.5 pounds. The pitted surface characteristic of meteorites is well illustrated. Some of the surfaces of fracture show "slickensides." The metallic grains of the interior are shown in the polished sections.

**Cases 3 and 4.**—Casts showing form and surface characters of meteorites. Those in Case 3 are largely of aerolites, those in Case 4 of siderites. These casts are made before the meteorite is cut for distribution. Some of the forms possessed by meteorites will be seen to be remarkable, notably that of Babb's Mill, which is cigar shaped, and those of Hex River Mts. and Kokstad which have a shape like the under jaw of a mammal.

**Pedestals 9 and 11.**—Models of three large iron meteorites found many years ago in the State of Chihuahua, Mexico, and now in possession of the School of Mines in the City of Mexico. With one exception these are the largest meteorites known.

**Pedestal 12.**—Two large masses of Canon Diablo, Arizona, meteorites, weight 1013 and 265 pounds.

Note the natural perforation through which the chain passes by which the smaller one is hung. It well illustrates the auger-like action of the air to which a meteorite is exposed during its passage to the earth. These meteorites are also remarkable as containing minute diamonds.

**North Wall.**—Map showing distribution of meteorite falls in the United States. The apparent paucity of falls in the Western States is due to a lack of population there rather than to a lack of falls.

For detailed information regarding the specimens and meteorites in general, the Guide and Handbook of the collection, a copy of which will be found in the Hall, may be consulted.

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## HALLS 63 AND 64.

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### SYSTEMATIC MINERALOGY.

The systematic collection of minerals numbers about 5,000 specimens. The arrangement of the collection is based upon that given in Dana's New System of Mineralogy, and so far as possible the purpose has been to illustrate the different species there described. A copy of this work may be found in the library. The order which is to be followed in a study of the collection is shown by the numbering of the cases. Thus, entering Hall 63 from the south, the visitor finds case No. 1 at his or her left, and the order then follows along the west wall through the oxides in Case 4, back on the western side of the center aisle, down the eastern side, and back along the east wall; then passing to Hall 64, the order continues with the phosphates in Case 15 on the western side and ends with Case 17 on the eastern side.

Complete case labels above each case indicate the groups to which the specimens beneath belong, and show the chemical composition and system of crystallization of each species. The specimen labels show the name of the species, its number in Dana's system, its museum number and the locality.\*

\*Owing to the lighting of the hall from above, a good observation of the specimens is somewhat hindered by the reflection from the cases. In order to avoid this the observer is advised to view the specimens from the side rather than from the front.

**Cases 1A, 3A, 4, 6B, 8A, 10B, 15, 16.**—As specimens worthy of especial notice may be mentioned, among the sulphides, Case 1A, the large crystals of stibnite from Japan; among the haloids, Case 3A, the beautiful green and purple fluorites from English and American localities; among the oxides, Case 4, the extensive collection of natural and artificially colored agates from South America; among the carbonates, Case 6B, the magnificent groups of calcite from Joplin Missouri, the curiously distorted crystals, sometimes called "butterfly twins," from Egremont, England, and the brilliant groups of the same mineral from the Big Rig Mine, Cumberland, England; Case 7A, the Flos Ferri aragonites, which look like triumphs of the confectioners' art, and the delicately tinged stalactites of the same mineral from the Copper Queen Mine, Arizona; among the silicates, Case 8A, the large crystals of Amazon stone from Pike's Peak, Colorado, and, Case 10B, the transparent and perfect crystals of topaz from Siberia; among the phosphates, Case 15, the richly colored vanadinites from Arizona, and among the sulphates, Case 16, the brilliant groups of barite from Cumberland, England, and of celestite from Sicily.

**Case 13.**—A collection of natural and polished specimens of agatized wood from Arizona.

**Case 14.**—A large display of the beautiful rubellite in lepidolite from San Diego County, California, and some massive gypsum crystals from a cave in Wayne County, Utah. These crystals are of remarkable size, some being nearly four feet in length, and they are nearly transparent.

**Case 17A.**—Collection of pseudomorphs, which illustrate the way in which one mineral may imitate or replace another.

**Cases 17B and C.**—Series illustrating the physical properties of minerals, such as form, structure, diaphaneity, lustre, hardness, and specific gravity.

**Cases 17D, E, and F.**—A series of crystal models, representing the typical forms and position of the axes in the six systems of crystallization. Together with these are a number of models of crystals of the more common mineral species, and some of the crystals themselves. The models are mounted in their true crystallographic position, and are intended to illustrate not only the proper position, but also the distinctive crystal forms which characterize the common minerals.

**Case 17G.**—A series of models of gold nuggets of remarkable size.

**Cases 18 and 19.**—Crystals of fluorite and quartz of exceptional size and beauty, from various localities.

**Cases 20, 21 and 22.**—Gems and ornamental stones. Here are shown minerals used as sources of gems and ornaments and a series of imitation gems for comparison. A more extensive collection may be seen in Hall 32.

**Case 23.**—Slab of lapis lazuli from Peru, probably the largest single block ever quarried.

**Case 24.**—Group of amethyst crystals from Thunder Bay, Lake Superior.

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## HALL 65.

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### STRUCTURAL AND DYNAMICAL GEOLOGY.

The specimens here shown (together with these in Hall 66), illustrate the materials of the earth's crust and the processes of change which they undergo. They also illustrate many striking phenomena met with in the study of the earth's crust which are sometimes grouped under the title of Phenomenal Geography.

**Case 1.**—Results of the action of chemical forces. Dendrites—arborescent impressions on rocks of all kinds, which have often the beauty of a drawing. They are produced by the deposition of oxides of iron or manganese from waters which have permeated the strata. The aborescent forms are due to incipient crystalization similar to that which takes place when frost is deposited upon a window pane. Specimens illustrating metamorphism, which may be produced by pressure, as where chalk is changed to limestone, or by chemical changes, as where pyroxene alters to serpentine. Cementation, illustrated by specimens of coquina of various types, of trass, and of conglomerates varying in degree of consolidation.

Cave products, including stalactites and stalagmites from the Mammoth, Luray, Wyandotte and other caves, together with gypsum, epsom salts and other interesting cave products. Stalactites of sulphur, galena, barite and other minerals show that the formation of these objects is not confined to limestone regions.

**Case 2.**—Types of structure. Jointed structure. Illustrated by basalt from Mt. Holyoke, Mass., Auvergne, France, and other localities.

Jointed limestones and conglomerates. In one of the latter specimens the joint planes cut quite through the pebbles of the conglomerate, showing that the jointing has occurred subsequent to the formation of the conglomerate. Specimens illustrating cone-in-cone structure and stylolites. These are formed probably by local pressure.

Concretionary structure. Clay concretions from many localities. These take very various and curious forms so that they are often mistaken for fossil fruits or parts of animals. They may be several feet in diameter, as shown by some of the larger specimens.

Septaria. These are formed by the drying and shrinking of concretions and subsequent filling of the cracks with calcite. When cut and polished, as shown, they are objects of great beauty.

**Case 3.**—Specimens illustrating other varieties of concretionary structure, such as geodes, sand and limonite concretions, phosphate of lime, chert and flint nodules, oölitic and pisolitic limestones, orbicular diorite, etc.

Specimens illustrating variety of rock texture, which would properly follow here, may be found in Case 9, Hall 66.

**Case 4A.**—Stratified structure. This is illustrated by specimens of South Dakota sandstone, the colors of which bring out the strata more clearly, and by specimens of schists and shales. Faults, produced by a movement of the rock on a plane inclined to that of the strata, are illustrated here, also in Hall 66.

Cellular structure. Illustrated by lavas and scoriae. Where the cells have become subsequently filled with mineral matter, amygdaloidal structure is produced.

**Case 4B.**—Specimens illustrating glacial action.

Glaciated pebbles and boulders from the drift of Chicago, Rochester and other localities. Boulder of copper found in Dorr, Mich., which must have been brought across the bed of Lake Michigan from the Lake Superior copper regions by the continental glacier. Rock surfaces planed and striated by glacial movement. Similar specimens from regions of modern glaciers, such as Porfirio Diaz glacier, Mexico, and the Mer de Glace, Switzerland.

**Case 4C.**—Specimens illustrating effects of erosion by wind and water, also stages and forms of rock weathering. Ripple marked surfaces of exceptional size and degree of perfection. Surfaces showing mud cracks and rain drops. "Slickensided" surfaces.

**Case 5.**—Large specimens of types already mentioned. They include two septaria three feet in diameter, a surface four feet square showing cross ripple-marks, large glaciated surfaces from the well-known Kelly's Island, Ohio, locality, and others.

Upon the wall are framed specimens of the so-called ruin marble, a rock in which the natural faulting and coloring has been such as to give to the slab an appearance like a painting of a ruined city.

**Pedestal 6.**—Surface of sandstone, three by four feet, showing ripple-marks, from Berea, Ohio.

**Pedestal 7.**—Collection of basaltic columns from the Giant's Causeway, Ireland, and the Rhine Valley. The grouping of these is intended to illustrate the stair-way arrangement which usually characterizes cliffs of basalt. The columns are entirely of natural formation, being produced by the shrinkage of the basalts from cooling.

In Hall 66 will be found specimens of lava from the Italian and Hawaiian volcanoes. Specimens illustrating veins and their formation. Also rock faulting, folding and texture.

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## HALL 66. LITHOLOGY.

The collections shown in this Hall aim to illustrate the different varieties of rocks as they are known to petrographers and also to exhibit the characteristics of these rocks and their order of succession as they appear in different localities.

About 2,000 specimens are shown, most of them being of the uniform size adopted by petrographers—3 x 4 x 1 inch.

The specimens are classified under the heads of Eruptive, Aqueous and Metamorphic rocks. The Eruptive rocks are those which have been formed at great depths, and were once in a state of igneous fusion. Being most deeply seated they may be considered to be the primary rocks of the earth's crust, so far as it is

known. From these, aqueous agencies form the Aqueous rocks by erosion and deposit, or by chemical precipitation. The latter in turn may be changed to Metamorphic rocks by dynamical and chemical agencies, which, however, do not usually destroy the lines of stratification.

**Cases 1, 4, 5, and part of 6.**—Eruptive rocks. The classification which has been adopted for these is based upon the following plan:

First, an arrangement according to the percentage of silica. The highest in silica, or acidic rocks, are placed at the beginning of the series, then those having lower percentages and, last, the lowest, or basic rocks.

Thus, beginning with the granites, which have from 80 to 65 per cent. of silica, we pass among the coarse-grained rocks to the diorites, which have between 65 and 55 per cent., then to the gabbros and diabases, having usually more than 45 per cent. and end with the peridotites, having below 45 per cent. A corresponding series begins with the syenites, and ends with the nepheline rocks.

Second, under the divisions representing different percentages of silica, a vertical arrangement is adopted by which the coarse-grained or holocrystalline rocks are placed first, then those of finer grain or those having a porphyritic structure and, last, the amorphous rocks. Thus among rocks having from 80 to 65 per cent of silica, the granites, being coarse-grained, are placed first in the vertical order, the granite porphyries second, and rhyolite, nevadite, obsidian, etc., which are amorphous, last.

**Case 1.**—First row, *granite* and its varieties, such as *granitite*, *graphic-granite*, etc. These are rocks having quartz, potash feldspar, and one or more minerals of the mica, amphibole, or pyroxene groups as essential constituents.

Second row, *granite-porphyry*, *quartz-porphyry*, *vitrophyre*, *felsophyre*, etc. Like the preceding in composition, but more or less porphyritically developed.

Third row, *rhyolite*, *nevadite*, *pumice*, *obsidian*, etc. These are amorphous volcanic rocks, having high percentages of silica, usually more than 70 per cent.

The order of the series now passes on to Case 5, described on page 47.

It is interrupted in the numbering of the cases in order to give place to some collections illustrating rock regions and to the syenite-nephelinite series.

**Case 2.**—Collection of rocks of the copper and iron bearing regions about Lake Superior. This was prepared with great care by Mr. Oscar Rohn, and illustrates many important types of rocks in a region of great economic interest.

Rocks of Manhattan Island. These were obtained chiefly from excavations made in and about New York City. They are crystalline, metamorphic rocks, and illustrate well the great variations possible in kinds of rock in a small region.

**Upper part of Case 2.**—Lavas of the best known volcanoes, such as Vesuvius, Mauna Loa and the extinct volcanoes of Central France.

**Case 3.**—Lavas and other volcanic products of the volcanoes of the Valley of Mexico.

Rocks of the Green Mountain Range, as seen in passing eastward from Pittsfield, Mass.

These include a variety of schists, limestones and other metamorphic rocks ranging in geological time from the Archaean into the Devonian. They illustrate the different formations distinguished by geologists in the region.

**Case 4 and part of 5.**—*Syenite-nephelinite* series.

**FIRST GROUP.**—First row. *Syenite, minette*, etc. Holocrystalline rocks, having orthoclase and biotite as essential constituents.

Second row. *Trachytes*. Tertiary eruptive rocks, characterized by the predominance of an alkaline feldspar, usually sanidine, and freedom from quartz. An iron-bearing mineral is also usually present.

**SECOND GROUP.**—First row. *Nepheline or elaeolite syenites*. Rocks comprised of nepheline, orthoclase, and usually a pyroxenic mineral and plagioclase feldspar.

Second row. *Phonolites*, rocks consisting of an alkaline feldspar, with minerals of the nepheline and leucite groups, and usually a monoclinic augite.

**THIRD GROUP.**—*Tephrites* and *basanites*, rocks having nepheline or leucite and lime-soda feldspar as essential constituents. They are usually porphyritic in structure, with a more or less amorphous ground mass.

**FOURTH GROUP.**—*Kersantite, leucite basalt, leucitite, nepheline basalt, and nephelinite.* Rocks containing leucite or nepheline in place of feldspar, and these usually associated with augite.

**Case 5 and part of Case 6.**—**FIRST GROUP.** *Diorite* and *varieties*—holocrystalline rocks, having plagioclase feldspar and hornblende or black mica as essential constituents.

Second row. *Andesites* and *dacites*, amorphous or porphyritic rocks composed of soda-lime feldspar, black mica, hornblende, and in the case of the *dacites*, quartz.

Third row. *Porphyrites* of various kinds.

**SECOND GROUP.**—First row. *Gabbros* and *norites*. Rocks consisting of a basic soda-lime feldspar, with diallage or other pyroxene.

Second row. *Diabases*, rocks having plagioclase feldspar and augite as essential constituents.

Third row. *Basalts, dolerites* and *melaphyres*. The former are common rocks widely distributed in the form of dykes and intrusive sheets. They are popularly known as trap rocks. Their composition is like that of the preceding.

**THIRD GROUP.**—First row. *Pyroxene rocks, diallagite*, etc. Basic rocks, composed largely of pyroxene.

Second row. *Peridotite* and *varieties*, including *therzolite, picrite* and *dunite*. These are highly basic rocks, composed chiefly of olivine, but having chromite and other iron oxides usually present.

**Remainder of Case 6 and Case 7.**—Aqueous rocks. Rocks formed as chemical precipitates are placed first. These include *hematite, limonite, calcareous tufa, oölitic and pisolitic limestones, onyx, serpentine* and its varieties, *talc* or *steatite*, including *verd-antique marble* and *ophite, gypsum, alabaster*, etc.

Then follow rocks formed as sedimentary deposits, and fragmental in structure. The principal varieties of these are arranged in this order: *Sandstones, conglomerates, breccias, quartzites, shales, clays, tufas* or *tuffs, coquina, chalk* and *limestones*.

**Cases 8, 9 and 10.**—Metamorphic rocks.

These are divided into the stratified or bedded, and foliated or schistose.

The first class includes *crystalline limestones, marbles* and *dolomites*. They are made up chiefly of the mineral calcite, and are formed from the remains of mollusks, corals and other animals.

These produced limestone first and this was changed by the action of heat to the crystalline condition. In some cases the original fossils remain intact, as is illustrated in many of the polished slabs.

**Upper part of Case 9.**—Specimens illustrating rock texture, veins, rock folding. A series of wooden models illustrates structures produced by faulting.

**Lower part of Case 9 and Case 10.**—Following the *marbles* are placed the *crystalline schists*, which are rocks of variable composition, but characterized by a pronounced schistose structure, especially where mica is the prevailing constituent. Here are included *argillite*, *clay-slate*, *eclogite*, *quartzite*, *phyllite*, *paragonite schist*, *chlorite schist*, *mica schist*, and others.

Last in the series appear the *gneisses*, a class of rocks essentially like the granites in composition, but differing from them in structure, in that the constituents are arranged in approximately parallel bands or layers. These are the oldest of crystalline rocks, and are considered by many to represent portions of the primeval crust. Others, however, regard granites as the last term in the metamorphism of such rocks, and for that reason the gneisses have been placed in juxtaposition to them. *Varieties* of *gneiss*, based upon the prevailing mineral, whether *biotite*, *muscovite*, *hornblende*, or others, are included here.

## DIVISION OF ECONOMIC GEOLOGY.

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It is the purpose of the collections shown in this Division to illustrate modes of occurrence in Nature of the minerals and ores which have economic importance, to show the localities from which they are obtained, the processes used in their extraction and treatment, and their application to human arts and industries.

The specimens have for the most part been gathered from exhibits made in the Department of Mines and Mining of the Columbian Exposition, and were secured to the Museum by the Chief of that Department.

They may be conveniently classified into five groups, which can be most readily inspected in the order named:

Building stones and quarry products, Halls 67 and 68.

Carbon minerals, including coals, petroleum, etc., Halls 69, 70 and 71.

Ores and products of the precious metals and lead, Hall 72.

Ores and products of the useful metals, Halls 76 and 79.

Clays, sands and salts of the alkalies and alkali earths, Halls 77 and 78.

There are also included in this Division, a Departmental Library and Laboratory, and the office of the Curators.

In the arrangement of the collections a series of type specimens of each group of minerals is placed first. Then follow specimens illustrating different localities, arranged in geographical order, passing eastward from California. Then are illustrated, so far as the material at hand permits, methods of mining, processes of reduction or manufacture, and finished products showing the uses of the metal or mineral.

## HALL 67.

### MARBLES—DECORATIVE STONES.

This hall contains a collection of the best known foreign and domestic marbles and other decorative stones in the form of polished slabs. The names given on the labels are those by which the stones are commonly known, and in general refer to the color and markings of the stone rather than to the composition or the locality where it is quarried.

**Case 1A.**—"Winooski Marbles," mottled red dolomite quarried in the vicinity of Swanton, Vt.

Other Vermont marbles.

**Case 1B.**—Marbles from Norway and Greece.

**Case 2.**—Marbles, France.

France is noted for the beauty and variety of its marbles. Examples of many of the marbles used in the ornamentation of our houses and public buildings may be recognized in this case.

The names upon the specimen labels are in large part descriptive—that is, made up of terms, each applicable to a class of marbles. Thus *Rouge Antique* is a red marble of the shade found in the Roman ruins.

*Griotte*, the name of a variety of cherry, is applied to marbles having markings suggesting a mass of ripe red cherries.

*Jaspe* refers to specimens of the color of Jasper.

*Breche*, or breccia, is applied to those marbles which appear to be composed of angular fragments cemented together.

*Brocatelle* is said to refer to a kind of cloth. Marbles having the appearance of any of the brocatelles shown here may with propriety be called brocatelle.

*Campan* marbles are those showing a peculiar green net-work of veins.

A *Coquille* marble is merely a shell marble.

Other names are either simply descriptive, refer to localities or have no especial significance.

**Case 3.**—Marbles, Italy. Among these are some used by the ancient Romans.

**Case 4.**—Marbles, Africa. Serpentine. Next to marble the green or red serpentines are perhaps the most generally used of ornamental stones. Especially noteworthy are the curiously mottled red and dark green serpentines from Lizard Point, Cornwall, and the dark colored variety from Saxony which is turned on a lathe to form various ornamental objects.

**Case 5.**—Verde antique, ophite. The green serpentines seen in this case are now commonly known as verde antique, although the name was formerly applied only to those of the shade of green possessed by the Greek specimen E 504. The ophite from New York is a granular mixture of calcite and serpentine.

**Case 6.**—Travertine (*onyx marble. Mexican onyx.*) and stalagmite marble. The clear translucent specimens represent the travertine as originally deposited. The opaque red-brown effects are produced where air has had long access to the material in the ground and has caused oxidation of the iron contained in the specimens.

**Case 7.**—Marbles, United States. The most widely used United States marbles, all of which are illustrated here, are the Vermont, Georgia and Tennessee marbles. The Vermont marbles are fine textured and range in color from pure white through gray to black. The coarsely crystalline, brilliant marbles from Georgia run from white into the pinks. It must not be thought from the appearance of the case that colored marbles, such as

appear in the collection from foreign localities, do not exist in the United States. Deposits are known but for various reasons remain unworked.

**Cases 8 and 9.**—Marbles and gypsums, Great Britain and Japan. The best known of these is the encrinal marble of Devon, England.

The spheres are manufactured in Japan and exported as curiosities.

**Case 10.**—Granites and eruptive rocks.

Owing to their hardness and the consequent expense of working, these stones are not so frequently polished as the marbles, but, as illustrated by these specimens, when polished they often present very beautiful effects.

## HALL 68.

### BUILDING STONES.

This Hall contains a systematic collection of building stones.

**Case 1.**—Foreign building stones. Roofing slate.

**Case 2.**—Limestones and marbles. Four-inch cubes of many of the limestones and marbles of the United States used for building.

**Case 3.**—Sandstones. Four-inch cubes of many of the sandstones of the United States used for building purposes.

**Case 4.**—Granites. Four-inch cubes of many of the granites of the United States used for building purposes. The above four kinds of rock constitute nearly all the valuable building stones used in temperate climates.

**Case 5.**—Building stones of Mexico and Ecuador. These are mostly volcanic rocks, lavas and tuffs, which are sufficiently durable for mild climates and yet soft enough to be easily worked with simple tools. The building stones from Ecuador are ordinary pumice-stone.

**Case 6.**—Cubes of granite, showing the various ways in which the rock may be dressed.

**Platform 7.**—Slate, Wales. These specimens illustrate the manner in which blocks of slate are split or cleaved into a series

of laminae or thin plates, which may be afterwards cut to uniform sizes and used for roofing.

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## HALL 69.

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### COALS OF THE UNITED STATES.

Here one may study the distribution and extent of the coal fields of the United States, also the kinds of coal produced by each and the available means of transportation.

On a large plate-glass map in the center of the hall, scale ten miles to one inch, the coal fields of the United States as at present developed are indicated by areas in black, and the principal railroads connecting them are also represented.

**Cases 1-18.**—Specimens taken from these different fields, the exact locality of each being shown by figures on the labels corresponding to those on the map. The order of numbers is the same as the alphabetical order of the States. The specimen labels show the uses of the coal, the names of the operators of the mines, the means of transportation, the markets, and the analyses of the specimens. Other data will be given to any one desiring to obtain them, on application to the Curator.

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## HALL 70.

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### COALS AND HYDROCARBONS.

This hall contains a series of the carbon minerals, beginning with the diamond, and passing through graphite, the coals (anthracite, semi-anthracite, semi-bituminous, bituminous and lignite) to bitumen and asphalt.

**Case 1A**—Diamonds from Kimberly Mines, South Africa. "Blue ground" or matrix in which diamonds occur, from De Beers mines, Cape Colony, South Africa.

**Case 1B.**—Graphite. Coke and the bye-products of the coke ovens. From these bye-products are obtained ammonia, most

of our dyestuffs, creosote, carbolic acid, lyddite and many other substances of great importance.

**Case 2.**—Asphaltum minerals. Petroleum shale.

**Case 3.**—Rocks of the Saarbrücken Coal Fields of Germany. These form a typical series illustrating the rocks of a coal basin.

**Case 4.**—Peat and its uses. In this case are shown raw peat and stages in the process of making a fuel from it and of manufacturing it into textile fabrics and paper.

**Case 5.**—Lignites and Bituminous Coals from the Eastern States and Colorado.

**Case 6.**—Bituminous Coals from the Western States and South America.

**Case 7.**—Bituminous Coals from England. Coal from the Saarbrücken Coal Field, Germany.

**Case 8.**—Bituminous Coal from the Westphalian Coal Field, Germany. Series illustrating the grading and cleaning of coal by washing. Anthracite Coal. Cannel.

**Case 9.**—Asphalt and Cannel.

**Case 10.**—Section of coal seam five feet in thickness, from the Bore Hole seam, Duckenfield and Merthyr collieries, New South Wales.

**Case 11.**—Large blocks of anthracite and bituminous coal.

## HALL 71.

### PETROLEUM AND ITS DERIVATIVES.

This hall contains a very complete collection made by the Standard Oil Company to illustrate modes of occurrence in nature of the mineral oils of the United States, the methods used for distilling and refining them and the products obtained. It contains a specimen of crude oil from every pool in the United States; specimens of various oil bearing sands and minerals of the oil strata; models of oil refineries and a complete series of the products of petroleum. By following the order given below, the visitor will find illustrated: (1), the natural history of petroleum; (2), its manufactured products, and (3), the uses or applications of these.

**Cases 1, 2, 3 and 4.**—Crude petroleum, one specimen from every pool in the United States. The States represented are Pennsylvania, New York, West Virginia, Ohio, Indiana, Illinois, Kentucky, Louisiana, Texas, New Mexico, Kansas, Colorado, Wyoming and California.

The specimens are arranged to show gradations of color, this being seen to vary from black, through shades of dark green and brown, to amber, the greenish brown being most common. The light colored oils, though more attractive in appearance, do not have the value for economic purposes, of the black, thick oils.

**East Wall.**—Tubes filled with drillings from the successive strata passed through in search for oil. One of these represents a huge producer in the MacDonald field. A piece of the sandstone from which the oil was obtained is placed at the bottom.

**West Wall.**—Chart showing a geological section between Olean, N. Y., and Fort Wayne, Ind. Note the position of the oil bearing sands in these and the comparatively undisturbed condition of the strata. Such conditions have been favorable to the storage of vast quantities of petroleum and gas.

**South Wall.**—Chart showing a geological section between Olean, N. Y., and Massillon, Ohio.

**Cases 5 and 6.**—Specimens of oil-bearing rocks from a large number of localities. Besides sands will be seen limestones and sandstones, which show that compact rocks bear petroleum as well as loose sands.

**Case 7.**—Minerals and fossils of the oil bearing strata.

**Case 8.**—A large bottle—the largest ever blown—representing one barrel of petroleum. This is about the amount produced in the United States every two-thirds of a second of the year, day and night.

**Cases 9, 10 and 11.**—The products of the barrel of petroleum represented in Case 8, arranged according to the order in which they are obtained. These are (1), naphtha; (2), burning oils, and (3) residuum or petroleum tar. The processes and products of further distillation of the latter will also be seen.

**Case 12.**—Model of a modern oil refinery. The crude oil from the pipe lines is received in storage tank No. 1, and pumped from this tank to the crude oil still No. 2, where it is gradually heated until the naphtha and burning oils are driven off by distillation and passing through the condenser and receiving house

are collected in tanks 3, 4 and 5. The burning oil distillates are pumped to the large agitator where they undergo chemical treatment to render them fit for consumption. The crude naphtha is then redistilled in naphtha still No. 3, giving the various grades of gasolines and naphthas. The tar left after the first distillation is transferred to the tar still No. 6, where it is separated into light paraffine oil, heavy paraffine oil and still coke which remains in the still. The light distillate is used for fuel oil. The heavy oil is sent to the paraffine wax press house, where it is chilled and pressed to remove the paraffine oil, leaving the wax. The coke remaining in the still as a final residue is used for the manufacture of electric light and battery carbons. The reduced oil still is used for the production of lubricating oils.

Above this model will be seen one of the original refinery, built in Cleveland, O., in 1863.

The cases following show various finished products ready for sale, these being chiefly illuminating and lubricating oils with, however, a large variety of other useful articles.

**Cases 13 and 14.**—Fifty-six varieties of high and low-priced burning oils, showing the standards of each required by the laws of different States.

**Case 15.**—Cylinder oils of different grades. These are the heavier, more sluggish lubricating oils.

**Case 16.**—Special grades of lubricating oils. These include spindle, sewing machine, screw cutting and engine oils. They are light bodied and quick feeding as compared with the cylinder oils.

**Case 17.**—General lubricating oils, including miners' oil, leather oil and various engine oils.

**Cases 18 and 19.**—Bye-products of petroleum. These include paraffine wax, crude, semi-refined and refined, with illustrations of its uses for candles, matches, tapers, etc; axle grease, lantern oil, harness oil, "miners' sunshine," the safest material for burning in miners' lamps; vaseline products, such as cerates pomades, soaps and face paints.

**Case 20.**—Special grades of illuminating oils. These oils are designed to give the best light obtainable under the laws of each State. They are liquids of remarkable purity and brilliancy, the two finest—Pratt's Astral and Eocene—being hardly distinguishable from distilled water in color.

**Case 21.**—High test illuminating oils.

**Case 22.**—Illustrations of some of the varied uses to which petroleum products can be put. These include waxed paper for wrapping purposes, water proof coating for explosives, varnishes, wood stains and fillers, rubber cements, electric light carbons, etc. Series showing Russian petroleum and its products.

## HALL 72.

### PLATINUM, GOLD, SILVER AND LEAD.

The collections in this Hall comprise the typical platinum, gold, silver and lead ores. In the examination of these, as well as ores of other metals, it should be remembered that the mineral or metal is frequently present in such minute quantities that it cannot be seen by the naked eye or even with the aid of an ordinary magnifying glass. The ores usually possess, however, characteristics of appearance or of associations with other minerals, known as gangue minerals, which enable a skillful observer to recognize them as being metalliferous.

There are also to be seen here products resulting from the metallurgical treatment of the ores.

### PLATINUM.

**Case A.**—Specimens illustrating modes of occurrence of platinum in nature, from over twenty different localities, including Washington, Oregon and California, the United States of Colombia and the Ural Mountains. In all of these specimens the metal may be seen in the form of flattened grains often associated with iridium, osmium, palladium, gold, copper and chromite. The grains are usually found in river beds or placer deposits. A complete series of rocks and soils bearing platinum, from the Demidoff Platinum Mines, Nizhni Tagilisk, Ural Mountains is shown, as well as a series of concentrates produced by washing these in order to separate the metal. Some other uses of platinum are illustrated as follows: Russian platinum coin for a time used as money; coins struck in platinum and gilded which passed for gold.

in Portugal and Spain during the past century; bogus gold dust made of platinum grains plated with gold.

## GOLD.

**Case 1.**—Type specimens showing modes of occurrence of gold in nature. These are—*crystalized gold*; *free gold* in the vein-stuff; *iron pyrite* containing gold disseminated through its substance in invisible particles; *gold in slate* (the gold in the specimen is invisible); *combined with tellurium* in sylvanite, petzite, etc., (*telluride ores*); and *placer gravels* in which the gold occurs as particles scattered through gravel and sands. A more extensive exhibit of placer gold may be found in Hall 32.

**Remainder of Case 1.**—Gold ores, Pacific Coast. These are chiefly quartz, or quartz and pyrite. They are distinguished in general from ores of this class of other localities by a cleaner appearance, the absence of rust and disintegration, and by the smaller proportion of pyrite present.

**Cases 2, 3, Rear.**—Gold ores, Colorado. The ores of Cripple Creek, Col., which occupy the front of Case 2, should receive especial attention on account of their remarkable richness. Gold, which almost universally occurs free, is in these ores combined with tellurium (a substance related to sulphur) in the form of *telluride ore*.

**Case 3, Front.**—Gold ores, New Mexico and Arizona. The gold of New Mexico occurs chiefly associated with large quantities of silver and lead. These ores, worked chiefly for the latter metals, may be found in another part of the hall. The ores in this case are those in which gold is the principal metal sought.

**Case 4, Front.**—Gold ores, Black Hills, South Dakota. The Homestake ores included here are a good example of a low grade ore which may be made to yield a profit by working upon a large scale owing to favorable composition. Compare with the Alaska Treadwell ores in the rear of Case 1, which are also low grade ores.

**Case 4, Rear.**—Gold ores, Mexico.

**Case 5, Front.**—Gold ores, Brazil. These are chiefly from the state of Minas Geraes. They are very varied.

**Cases 5, Rear, 6 and 7, Rear.**—Gold ores, United States

of Colombia. These are from "El Dorado" from which came the first important yield of gold in the New World.

**Case 7, Front.**—Gold ores, Great Britain. The collection from the New Morgan Mine, Dolgelly, Wales, is worthy of special attention both on account of its completeness and on account of the character of the ore. The gold is nearly all free, and much of it is visible to the eye. Specimens of ore from various parts of the mine are shown, also specimens of the country rock.

**Case B.**—Collection of nearly all the known alloys of gold and silver with copper, tin, zinc, lead, arsenic and other metals. Collection illustrating methods of saving gold and silver practiced by Messrs. Tiffany & Co., New York. Here are shown wash water, concentrates from an exhaust blower that collects the dust of the shops, pieces of flooring of the shops, and shoes worn by workmen, and beside each of these are placed buttons of gold and silver obtained from articles of size similar to those shown.

**Cases C and D.**—Large specimens of gold ores, Colorado.

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## SILVER.

**Case 8, Front.**—Type specimens of silver-bearing minerals. These are, in the order of their richness: *native, or wire silver*; *argentite*, 87 per cent. silver; *cerargyrite*, 75 per cent. silver; *pyrargyrite*, 65 per cent. silver; *proustite*, 65 per cent. silver; *stephanite*, 68 per cent. silver. *Galena* and *cerussite* may also be regarded as ores of silver, for, though they contain but small percentages of silver, they are so abundant as to constitute very important ores. With these should be mentioned, *Tetrahedrite*, which may contain as high as 17 per cent. of silver. There are a number of rarer silver-bearing minerals.

**Case 8, Rear.**—Silver ores, Utah.

The specimens from Utah illustrate an unusual occurrence. They are from the Silver Reef, and consist of sandstone impregnated with argentite and cerargyrite. In one specimen these minerals may be seen replacing organic remains.

**Case E.**—Large specimens of silver ores, Colorado.

**Cases 9 and 10.**—Silver ores, Mexico.

This collection includes examples of both the ores and the rocks in which they occur of the important mining districts in Northern Mexico.

It is especially interesting as showing the association of the ores with eruptive rocks such as are characteristic of most of the richest silver deposits of the world.

**Cases 11 and 12 Rear.**—Silver ores, Nevada. These include the ores of the famous Comstock lode.

**Cases 12, Front, 14 and 15, Rear.**—Silver-lead ores, Colorado. These ores are especially abundant in Colorado. They occur in two forms; the sulphide ores, in which the silver is chiefly contained in galena, and the "carbonate" ore, a mixture of cerussite and anglesite. This "carbonate" ore comes from the decomposition of the sulphide ore. Pyrite often accompanies the galena in the sulphide ore, as is well shown in the series from the A. Y. and Minnie Mine.

**Case 13.**—Silver-lead ores, Leadville, Colorado.

**Case 15, Front.**—Lead ores.

Type specimens of lead-bearing minerals. These are—*galena*, 86 per cent. lead, the most abundant lead mineral and fundamental lead ore; and the following minerals formed from it by oxidation: *Cerussite*, 77 per cent. lead, and *anglesite*, 68 per cent. lead.

There are other minerals which contain lead, but they are not of sufficient abundance to be important as ores. The case contains also lead ores from Illinois, Wisconsin, and Missouri. These contain very little silver, and are mined for lead only. On the lower shelves are silver-lead ores from Utah, Arizona and Washington.

**Case 16, Front.**—Silver-lead ores, Mexico. Note the collection of carbonate ore from Minas Viejas, Villaldma, as showing how widely ores of this class may vary in appearance.

**Case 17, Front.**—Silver-lead ores, British Columbia. The localities represented lie just north of the State of Washington, between the Cascade and Rocky Mountains, at the latitude of Vancouver Island.

**Case 18, Front.**—Lead ores, Great Britain. The specimens illustrate well some of the common associations of galena. While in the Colorado ores the galena is commonly associated with pyrite, here we find it mixed with blende, a zinc ore which is very troublesome to the lead smelters. Specimens from the Welsh mines which contain much blende are marked "Poor Ground." A good specimen of fluorite shown here, illustrates another common

associate of galena in the English mines, as do also the specimens of calcite and galena. Some of these ores, as for example, that from Snail Beach, are from mines formerly worked by the Romans.

Note the general absence of "carbonates" and the fresh undecomposed appearance of the specimens. This is also true of the Spanish and German ores. Carbonate and disintegrated ores occur near the surface where air and atmospheric waters have acted and formed them from the sulphides. These mines having been long worked, most of the superficial ores have been removed, so that now only the sulphide ores occurring at great depths are mined.

**Cases 17, and 18, Rear.**—Silver-lead ore, New Mexico. The principal ores of this class come from the Magdalena Mountains. They run low in silver, averaging only about 8 oz. per ton, and the percentage of lead is also low. Here may be seen specimens of the "sand carbonate" ore, which crumbles to powder when handled.

**Cases 19, Front, and 20, Front.**—Lead ores from Germany. Some of the specimens here are especially instructive as showing the characteristic structure of veins. The different minerals are arranged in bands or layers, the metalliferous layers alternating with those of quartz, barite or fluor spar.

**Case 19, Rear.**—Silver-lead ores, Greece. Unique among these are the slags of Laurium, which are worked by the Greek Metallurgical Company. The mines of this locality had been operated by the Greeks from the time of Themistocles up to the first century, A. D. Owing to the imperfect methods which they used, however, the slags produced retained appreciable quantities of metal. The modern company, collecting these slags and using them as ores, extracts sufficient lead and silver to yield a good profit.

**Case 20, Rear.**—Silver-lead ores, Spain and New South Wales.

**Cases F, G, H, I and J.**—Illustrate the extraction of gold, silver and lead from their ores. Out of a multitude of processes used, six of the more typical ones are illustrated. In general, the extraction is carried on by a series of operations. On one side of the case is placed the ore, and lines are drawn from it to the specimens of the materials formed from it by the first operation of

extraction. From each of these specimens lines are likewise drawn to specimens of the substances formed from them in subsequent operations, and so on until the final products are shown. It is thus possible for the visitor to follow readily each step of the operation.

**Case F.**—The Cyanide process for the extraction of gold from low grade ore as carried out at Mercur, Utah. This process depends upon the solution of the gold from the ore by a dilute solution of cyanide of potassium and precipitation by metallic zinc. The case also contains a collection of concentrates from gold and silver ores, illustrating the process of enriching ores before smelting by the removal of much of the worthless material by mechanical means.

**Case G.**—Extraction of gold as practiced at the Argo Smelter, Colorado. This is a type of the processes where the gold is collected in copper by smelting and then isolated by a process of leaching or solution.

**Case H.**—Extraction of silver and lead as practiced at the Unterharz, Germany.

By following the labels it will be seen that this apparently complicated process is resolved into the frequent repetition of comparatively few operations.

**Case I.**—Extraction of lead and silver by the reverberatory process and by the blast furnace process. These do not represent the process of any particular smelter, but rather are generalized forms of the two most important smelting processes.

**Case J.**—Extraction of gold, silver, lead and copper as practiced at the Oberharz, Germany. As with the process illustrated in Case G, the apparent complexity is due to many repetitions of few processes.

The visitor should now pass to the eastern end of the hall and note the following special groups in the center.

**K.**—Silver, lead and copper ore, Cordillera Hill silver mine, Peelwood, New South Wales.

**L.**—Gold and silver ore, British Columbia.

**M.**—Gold ore. A group of large specimens of free milling quartz from various localities.

**N.**—Zinc-lead ore, Laurium, Greece.

**O.**—Copper-silver ore, Leadville, Colorado. Assays gold, \$6. per ton; silver, 41 oz. per ton; copper, 18 per cent.

**Q.**—Gold-copper-silver ore, Ouray County, Colorado. Assays copper, 28 per cent.; silver, 160 oz. per ton.

**R.**—Auriferous quartz, San Miguel County, Colorado. Assays average \$6 to \$8 gold per ton.

**S.**—Gold ore. A group of large specimens of refractory gold ores.

**T.**—Block of ore from 40 foot level of the Back Creek Silver and Gold Mine, New South Wales. 36 tons yielded 3,406 oz. silver, and gold at the rate of 15 dwt. per ton.

**U.**—Gold ore, Alma, Park Co., Colorado. Assays \$25 per ton.

**Wall Case V.**—Large specimens of silver and lead ores.

Around the walls of the room will be found, arranged in order, large blocks of gold, silver and lead ores, giving an excellent opportunity to study the characteristic appearances of such ores and the minerals most commonly associated together in them. The latter are quartz, fluorite and barite, copper and iron pyrites and galena. The rusty looking ores are simply more or less decomposed forms of the above.

## HALL 80.

### West Dome.

Beneath the center of the dome stands a statistical column, giving the bulk of each product of the mines of the United States in 1892, for one second of time. Multiplying this by the number of seconds in the year (31,536,000) will give the annual product. This column was built according to data given by the United States Geological Survey. In the four niches are pyramids of ore, containing: No. 1—Gold and Silver Ores; No. 2—Tin Ores; No. 3—Iron Ores; No. 4—Copper Ores.

The four large specimens surrounding the column are respectively: No. 5—Zinc Ore; No. 6—Silver Ore; No. 7—Iron Ore; No. 8—Nickel Ore.

## HALL 79.

### COPPER, ZINC, TIN, ANTIMONY, MERCURY, NICKEL, IRON, MANGANESE AND THE MINOR METALS.

The collections in this hall comprise the typical copper, zinc, tin, antimony, mercury, nickel, iron, and manganese ores, and the ores of various metals of minor importance. There are also to be

seen products resulting from the treatment of some of the ores and charts showing processes of extraction of the metals.

Under each group are placed first, type specimens of the different ores of the metal arranged in order of their richness; then specimens of ores which illustrate the different localities producing them, these being arranged in geographical order. Specimen labels show the mineral of the ore and the amount of metal contained where this is known. It should be remembered that many of the ores produce more than one metal, in which case the specimen is placed in the group of the predominating metal.

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## COPPER.

**Case 1.**—The copper bearing minerals, arranged in order of their richness; the *native metal*, this being the character of most of the ore from the Lake Superior mines; the red oxide, *cuprite*, 88 per cent. of copper; the black oxide, *tenorite*, 80 per cent.; the black sulphide, *chalcocite*, 80 per cent.; the green carbonate, *malachite*, 57 per cent.; the blue carbonate, *azurite*, 55 per cent.; the purple sulphide, *bornite*, 55 per cent.; the gray sulphide, *tetrahedrite*, about 50 per cent.; the bluish green silicate, *chrysocolla*, 36 per cent.; and the brass yellow sulphide, *chalcophyrte*, 34 per cent.

**Case 2.**—Copper ores, Eastern States and Michigan.

**Case 3.**—Copper ores, South America and West Indies.

**Case 4, Rear.**—Copper ores, New South Wales.

**Case 5, Rear.**—Copper ores, Germany.

**Cases 4 and 5, Front.**—Copper ores, New Mexico and Arizona.

**Case A.**—Specimens illustrating successive stages in the process of copper smelting and separation.

**Case B.**—Specimens of electrically deposited copper illustrating the electric mode of refining. A very complete collection of the native copper and associated minerals of Keweenaw Point, Michigan.

On the adjacent walls are charts showing courses of treatment of copper ores practiced by different smelters. Below them are large masses of copper ores.

## ZINC.

**Case D.**—Zinc ores, New Jersey and Wisconsin.

The ores from New Jersey are unique. They consist chiefly of the oxides *franklinite* and *zincite* and the silicate *willemitite*. This is a combination of ores that occurs nowhere else.

**Case E.**—Zinc ores of Missouri. The zinc-bearing minerals of these ores are chiefly the black, resinous sulphide, *sphalerite* and the white carbonate, *smithsonite*.

**Case F.**—Zinc ores, northwest Arkansas. The zinc is largely in the form of the white carbonate, *smithsonite*.

**Case 6.**—Zinc ores, Great Britain; chiefly *sphalerite*. Though the *sphalerite* varies much in color in these specimens, it may always be distinguished from the associated minerals by its resinous appearance. The very dark specimens are the "black jack" of the Cornish miners.

**Case 7.**—Zinc ores from Spain and Germany. Note the parallel arrangement of the minerals in the latter, this being a characteristic of vein deposits. The chief mineral, *sphalerite*, is associated with quartz, galena, pyrites, etc.

**Cases 8, 9 and 10.**—Zinc ores chiefly from Laurium, Greece and New South Wales. The former have long been famous for their varieties of color and richness of luster, making them very attractive to the eye. They are made up chiefly of the carbonate, *smithsonite*.

Specimens illustrating the process of extraction of zinc, are shown in Case 10.

## TIN.

**Case 11.**—Tin ore from South Dakota. The tin is in the form of *cassiterite*, a black oxide which can be seen scattered through the granite. This is the universal ore of tin, containing when pure about 78 per cent. of the metal. Some specimens of stream tin are also shown. This is formed by disintegration of the rocks containing the ore, and removal of the lighter minerals by running water. The *cassiterite* being very heavy stays behind and is found in the bed of the stream.

**Case 12.**—Tin ore, New South Wales.

**Case 13.**—Tin ore from the famous Cornwall Mines of Great Britain, which have been in operation many centuries.

Process of reduction of tin ores illustrated by specimens from the Redruth Smelting Co.

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### ANTIMONY.

**Case 14, Front.**—Specimens of *stibnite*, the universal antimony ore, from various localities in Japan, California, New South Wales, United States of Colombia and Greece. Many of the specimens bear an appreciable percentage of gold.

Ingot antimony and products of smelting stibnite.

**Case 14, Rear.**—Ores of metals of minor importance. These include ores of arsenic, bismuth, molybdenum, uranium and wolfram.

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### MERCURY.

**Case 15.**—A series of ores containing *mercury* and *cinnabar* and the rocks associated with them, from the New Almaden mines, California. Cinnabar is the red sulphide and the mineral from which mercury is chiefly obtained. Mercury ores from Spain, Russia, Mexico and the United States of Colombia are shown.

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### NICKEL AND COBALT.

**Cases F and I.**—A complete series showing ores of nickel, processes of extraction and applications of the metal. Note as the principal ores, the bronze colored sulphide, *pyrrhotite*, and the apple green silicate, *garnierite*.

Nickel ores from Canada, Oregon, Missouri and New Caledonia. A chart near by gives the process of extraction of nickel from the Canadian pyrrhotite. As uses of the metal, are shown specimens of plating, nickel steel alloy for armor, salts of use in the arts, etc.

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### ALUMINUM.

**Case 1.**—Ores and products of aluminum.

The ores from which aluminum is ordinarily obtained—baux-

ite, gibbsite and cryolite—are shown in the case, together with pigs and sheets of the metal and specimens of its alloys.

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## IRON.

**Case K.**—Iron ores from the ranges of the Lake Superior region. It is the near presence of the remarkably pure and abundant deposits of *hematite* and *magnetite* that has enabled Chicago's iron industry to attain its present importance.

**Case L.**—Type specimens of iron ores. These are:—the black oxide, *magnetite*, 72 per cent. iron; the red oxide, *hematite*, 70 per cent. iron; the hydrous oxides, *turgite*, 66 per cent. iron; *göthite*, 64 per cent. iron; and *limonite*; 60 per cent. iron; the carbonate, *siderite*, 48 per cent. iron. Many varieties of these ores are shown, which are known by the names of *yellow ochre*, *bog ore*, *pipe ore* and *brown hematite*, forms of limonite; *red ochre*, *specular*, *micaceous*, *needle* and *kidney ores*, forms of hematite; *clay iron stone*, *black band*, and *spathic ores*, forms of siderite. The rest of this case is occupied by ores from the Western states.

**Case 16.**—A series of limonites from the Eastern states that illustrate the transition from a porous, impure bog-iron ore, to a compact brown limonite and through *göthite* and *turgite* to hematite.

**Case 17, Front.**—Iron ores, Western States.

**Case 17, Rear.**—Iron ores, New South Wales.

**Case J.**—Iron ores, England, France, Germany and Russia. Conspicuous among the English ores are the ochres, which are mixtures of limonite or hematite with clay; the soft, bright red hematites which occur in limestone, and the compact spathic ore of the coal measures. The German irons show the more fibrous hematites and limonites and the well crystallized "sparry" siderite.

**Case H.**—Iron ores, South and Central America together with a series of ores and associated rocks from the *Cerro Mercado* or Iron Mountain of Mexico.

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## MANGANESE.

**Cases 18 and 19.**—Ores of manganese, Colorado, Virginia, Arkansas, Brazil and Great Britain; chiefly the black oxides,

*pyrolusite* and *psilomelane*. By far the most important use of manganese is in the manufacture of steel. It is also used in large quantities for the liberation of chlorine for bleaching, for staining glass and pottery, and in the extraction of gold from its ores.

**Case 20.**—Alloys illustrating uses of iron and manganese.

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### CENTER OF THE HALL.

**M.**—Gossan (iron ore), from Virginia.

**N.**—Limonite (oxide of iron), from Virginia.

**O.**—Mass of copper-nickel ore, from the Stobie mine, Sudbury, Ontario, Canada, taken from the third level at a depth of 175 feet, and weighing about 12,000 pounds.

**P.**—Limonite (brown oxide of iron), from Russia.

**Q.**—Zinc-lead ore, France.

**R.**—Statue of Vulcan, the Roman god of fire and metal working, of hammered copper on a pedestal of iron beams, from the exhibit of Gebrüder Stumm at the World's Columbian Exposition. It typifies strength and skill in utilizing the products of the mineral kingdom.

**S.**—Hematite (red oxide of iron), Wyoming.

**T.**—Copper ore (bornite), Cape Colony, South Africa.

**U.**—Large mass of Smithsonite (zinc carbonate), Arkansas. The weight of this mass is about 10,000 pounds.

**Wall Cases V and W.**—Large specimens of the ores shown in this hall which give some idea of how such ores look in bulk.

The visitor should now return to the dome and turning to the left pass into hall 76.

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### HALL 76.

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### METALLURGY OF IRON AND STEEL.

This hall contains a series of the intermediate and final products of the iron-working industry, intended to lead the visitor gradually from a view of the mining of the ore to some of the higher products of the iron-worker's art.

**No. 1.**—Model of the Chandler iron mine, Ely, Minnesota. At the rear of the model two shafts descend and at levels 60 feet

apart, horizontal galleries run from the shaft and connect at intervals with other passages. Figures of miners at work may be seen by looking through these cross-ways from the ends of the model. From the two main galleries, sloping ways, not shown in the model, lead upward to passages at higher levels which do not connect with the shaft. Here as the ore is excavated it is thrown through chutes to the tramways of the main galleries, and there taken by ore cars to the shafts and raised to the surface. The timbering is to prevent the top and sides from caving. Upon the wall is a large painting representing a section of the Soudan Mine of Tower, Minn.

**Case 2.**—The extraction of iron from its ores by the blast furnace. The material fed to the furnace and given out by it is shown, also a series of pig irons showing the characteristic fractures of the different grades.

**Cases 2 and 3 B.**—Alloys of iron used in iron working.

**Cases No. 3 A and 4 A.**—A collection illustrating the methods of testing structural iron and steel. In general a piece of steel is broken and the strain at which it yields is noted. Other pieces are bent hot and cold and their behavior in respect to cracking is noted. At the ends of the cases are specimens showing the successive stages of rolling an ingot into a rail or beam, also the method of crushing a number of bars or "*pile*" of iron into one solid beam.

**Case 3 C.**—Fibrous fracture of wrought iron.

**Case 3 D.**—"Crystalline" fracture of wrought iron.

**Case 4 C.**—Malleable cast iron. This is a cast iron the surface of which has been decarbonized and thus transformed into wrought iron by the action of oxide of iron at a high temperature.

**Case 4 B.**—Direct process wrought iron. The example shown is over 2000 years old, and was made directly from the ore without passing through the stage of pig iron.

**Cases 4 C and D.**—Fractures and test pieces of open hearth steel from Avesta, Sweden, showing the variation of texture and strength with the composition.

A bar of open hearth steel in which a knot has been tied cold, as a test of the quality of the material stands upon the wall by the side of this case.

**Case 5.**—Sections of steel bars, rails and structural beams, from Spain, donated by Sociedad de Altos Hornos y Fábricas de

Hierro y Acero de Bilbao. (The Bilbao Iron and Steel Manufacturing and Blast Furnace Co.)

**Case 5A.**—A series of fractures of crucible steel from the Dannemora Steel Works of Sheffield, showing the relation of composition hardness and the appearance of the fracture.

**Case 10.**—Bars of mild open-hearth steel tied cold into knots as a test of quality. A collection of all grades of scrap-iron and metal. It contains samples of different grades of iron and metal as it is sorted on leaving the scrap-iron dealer's yard.

**No. 6.**—Wires for various purposes. On the wall are specimens showing the process of drawing wire.

**Nos. 7, 8 and 9.**—Models of three types of hot blast stove used for heating the air delivered to the blast furnace.

**No. 11.**—Model of a rolling mill for rolling structural iron and steel. This mill rolls the largest beams of any in Germany.

**No. 12.**—Model of machinery and annealing furnaces used in preparing molds for cast iron pipe.

**No. 13.**—Model of a rolling mill. The three models, Nos. 16, 17 and 18 show portions of the iron works of Gebrüder Stumm, Germany.

Upon the walls there is a series of charts illustrating most of the furnaces used in the manufacture of iron.

## HALL 77.

### CLAYS AND SANDS.

*Kaolin* or Clay is the basis of most of the specimens shown in this room.

**Case 1.**—Composition of Clays. A collection designed to show what are the usual components of clays and what effect the ordinary impurities have upon the usefulness of the substance.

**Meerschau.** This is not a clay but is included here on account of its use for pipes.

Application of blast furnace slag to the manufacture of fine pottery.

**Case 2.**—Fire Clays, with specimens of objects made from them and designed to withstand intense heat.

**Case 3.**—Fine Clays. These include the porcelain and china clays, pipe and paper clays with fuller's earth and other clays suited to special uses.

**Case 4.**—Brick clays. Brick clays are the common clays. Any clay that can be molled and will bake to brick without deforming or cracking may be used as a brick clay. Such clays are usually very impure.

**Case 5.**—Soils. A collection designed to illustrate the formation of soils from rocks—and to show the different kinds of soils and their compositions.

**Cases 6 and 7.**—Briquettes. These are miniature bricks made from a great variety of foreign and domestic clays and designed to illustrate the variety in color, density and other characters of bricks made from these clays.

**Case 8.**—Terra cotta and foreign bricks. Foreign bricks are shown from Mexico, Santo Domingo and La Rabida Convent, Spain. These are of the shape known as Roman brick, longer, thinner and wider than the ordinary type of bricks.

**Case 9.**—Sand and cement. A collection showing all stages in the manufacture of Portland cement. A collection showing varieties of sand adapted to different uses, such as molding sand for molds for metal castings; pure sand for infusible furnace hearths and furnace bricks; sand for the manufacture of glass, etc.

**Case 10.**—Natural pigments used for paints. The greater number are the ochres or clays colored red, yellow or brown by oxides of iron and manganese.

Around the walls of the room are specimens of ornamental tiles,

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## HALL 78.

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### SALTS OF THE ALKALIES AND ALKALINE EARTHS.

These include besides salts and similar compounds such minerals as asbestos and mica. Here also belong the borates, phosphates, etc., which occur in nature chiefly in combination with lime or soda. Besides the alkali and alkali earth compounds, sulphur and abrasives may be found in this hall.

**Case 1.**—An unusually large and complete display of the “Stassfurt Salts.” These salts are rich in potash and magnesia, and furnish nearly the whole of the world’s supply of potash.

**Case 2.**—Applications of potash salts. A collection of the compounds of potash as used in the arts.

**Case 3.**—Soda salts.

The most important mineral in this class is salt, many varieties of which are shown. Cryolite and its ores. The process of making soda and alumina from cryolite is fully illustrated.

**Case 4.**—Lime and Magnesia salts. These include gypsum, dolomite and magnesite. Applications of gypsum are included here as well as celestine and barite, compounds of strontia and baryta, alkaline earths allied to lime.

**Case 5.**—Gypsum. This is a hydrated sulphate of lime from which plaster-of-paris and the fertilizer land-plaster are made.

**Case 6.**—Borates. The minerals from which borax is obtained and their products.

**Cases 7 and 8.**—Phosphates.

Mineral and rock phosphates from well-known localities in England, Spain, Canada, Carolina, Tennessee and Florida. Guano from Venezuela and Santiago de Cuba.

**Platform 14.**—A large specimen of apatite from Canada.

**Case 9.**—Sulphur. Besides native sulphur from many localities, examples are given of the more important metallic compounds from which sulphur is obtained in commercial quantities. The various forms in which sulphur comes to the market are illustrated.

**Case 10.**—Asbestos. These specimens are of asbestos as mined and are not confined to the commercially valuable material but include also many specimens of grades which at present are of little economic importance. Consequently all stages between a nearly compact but somewhat columnar tremolite and the finely fibrous flexible asbestos of the best quality may be traced through these specimens.

**Case 11.**—Mica. Besides the thin plates of mica of the best quality from leading American and Russian quarries, specimens of low grade material enable the visitor to note the difference between the ordinary micas and the more valuable kinds.

**Case 12.**—Abrasives. The rocks and minerals associated with emery are characteristic and should be examined in connection with the emery itself. The great variety in mineralogical composition of the abrasives should be noted. Carborundum and crushed steel represent the class of artificial abrasives.

**Platform No. 13.**—Large specimens of gypsum and fluor spar. Large specimens of rocksalt and epsomite or natural epsom salts. Large specimen of natural sulphate of soda (*Glauber's salt*). Salt, Stassfurt Prussia.

**Case 15.**—Applications of Asbestos.

**Case 16.**—The Leblanc process for the manufacture of soda. All stages of the process are illustrated by specimens of the raw, intermediate and final products. The relation of the various products to each other are indicated by the connecting lines.

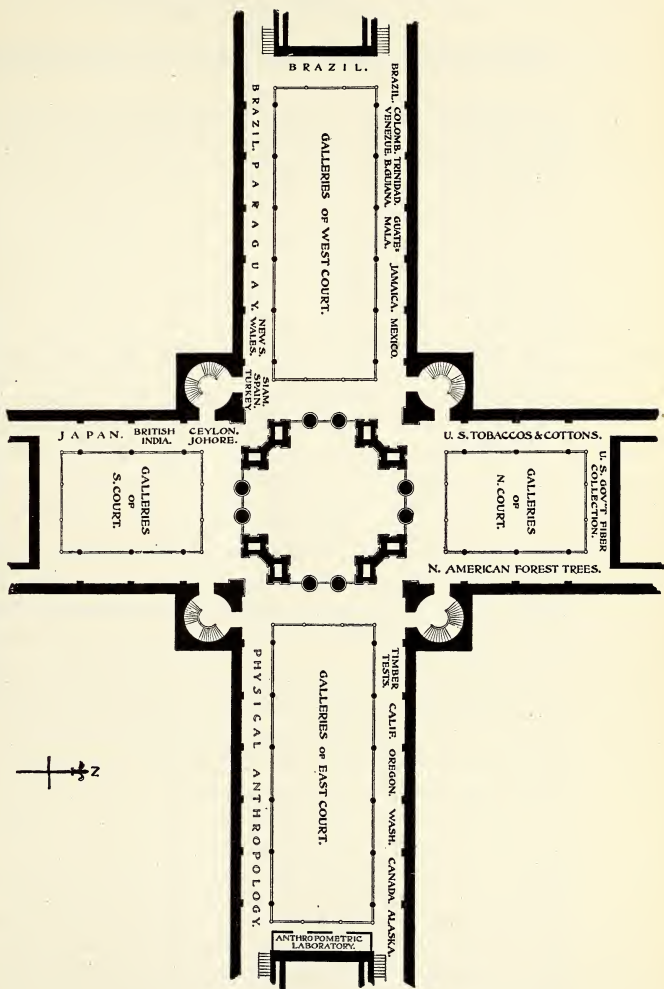
**Case 17.**—The ammonia process for the manufacture of soda. This process is fully illustrated by a series of the raw materials, intermediate and final products so arranged that the process may be followed step by step.

## HALLS 73, 74 AND 75.

**Hall 73.**—Office of the Department of Geology.

**Hall 74.**—Library of the Department of Geology. The works in this library treat of geology and kindred subjects, and are intended primarily for the use of officers of the Department. On application to the Curator, however, opportunity will be given to visitors to consult any special work.

**Hall 75.**—Laboratory of the Department of Geology.



# PLAN OF DEPARTMENT OF BOTANY.

The Illinois section occupies the North Gallery of South Court.  
The Russia section occupies the East Gallery of South Court.

## DEPARTMENT OF BOTANY AND PLANT ECONOMICS.

This department occupies the galleries of the North, South, East (in part) and West Courts of the main building, and may be reached by any of the four flights of stairs in the central rotunda, or by the stairways at either side of the east and west main doors.

The collections of this department comprise, in the main, those of the foreign governments in forestry, as exhibited in their Government Buildings, and in the Forestry Building at the World's Columbian Exposition; the major portion of the gums, oils, medicinal plants, tan barks, dye woods, seeds and fibers exhibited by the foreign countries in the Agricultural and Manufactures Buildings; the Economic Plant Exhibit of the U. S. Government as exhibited in the Government Building, and portions of many American exhibits in this important branch of natural science.

The general arrangement of the department is as nearly geographic in character as is possible. Beginning at the northeast corner of the South Court the visitor travels westward through Russia, Corea, Japan, India, Ceylon, Johore, Siam, Turkey, Spain and Australia; thence, beginning at the Straits of Magellan, northward through Argentine, Paraguay, Brazil, Venezuela, Trinidad, British Guiana, Ecuador, Colombia, Guatemala, and Mexico, to the United States as far as Alaska, meeting there the starting point, Russia.

The special aim in the installation of the objects in this department has been to insure scientific arrangement, although enough display has been made to attract and please the general visitor; especially has this been done when possible without detriment to the natural sequence of species. Sufficient time has not yet elapsed to study into the correctness of all the identification labels attached to the specimens when received, and which have so far been principally retained. This should be born in mind by those who desire to enter into discriminate study of the collections. All the identifications are being determined by the head of this department as rapidly as is consistent with careful and systematic results, and printed labels substituted for the originals. The printed labels are to be considered correct as far as our knowledge extends at this date.

## GALLERIES OF THE SOUTH COURT.

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**Cases 1 and 1A.**—The Cork Oak (*Quercus suber*) and its utilization.

Among the specimens exhibited is a very fine and costly decortication of a tree with three branches. This specimen is considered to be the best example of dextrous cork-peeling ever procured.

**Cases 2A, 2B, 2C. 2D,** and the space accompanying same, are devoted to the indigenous trees of Illinois.

Notable in this collection is a complete set of the oaks of Illinois, accompanied by water-color representations of the leaves and fruits.

**Cases 2E, 2F, 2G,** and the accompanying space, are devoted to the cultivated trees of Illinois.

Fine example of Honey Locust, White Ash, and several species of Oak.

**Case 2H.**—Grains of Illinois.

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## RUSSIA.

**Case 3.**—Russian Tobacco. The first tier in this case comprises the original natural species (*Nicotiana rustica*), from which most of the finer cultivated forms have sprung. The balance of the specimens are of the variety known as Turkish leaf, cultivated in different sections of the country.

**Case 3A.**—Russian Flax. In this case may be found excellent specimens of dressed and undressed flax, together with the plants from which this useful fiber is obtained.

**Case 3B.**—Lime Tree Products. Probably the most useful tree to the Russian peasant is the Lime or Linden (*Tilia parviflora*), from the best layers of which many households gain the major portion of their useful appurtenances, even the structure of the dwelling itself, its floor covering and its furniture. Among the specimens will be found the natural bark, the inner layers, the fiber, both crude and macerated, matting, bags, ropes, harness, shoes, trunks, etc.

**South Wall.**—On the east wall platforms extending through this section will be found the principal commercial timbers of Russia, both in log and plank.

**Cases 4, 5, 6, 7, 8, 9 and 10.**—These cases contain the cereals and legumes of Russia.

This is probably as complete a collection of the species and varieties of the agricultural seeds of that country as can be found in any Museum in the world.

**Case 11.**—Turpentine industry of Russia.

This case contains the commercial products of the distillation of pine.

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### COREA.

**Cases 11A and 11B.**—A collection of the woods, cereals, nuts, and dried fruits of this peninsula.

A comparison of the woods of this country with those of Japan, will prove interesting.

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### JAPAN.

**Cases 11C, 11D, and 11E.**—The fibers, tobaccos, and teas of Japan.

**Case 12.**—Specimens of insects injurious to useful plants of Japan.

This beautiful and highly scientific collection showing the successive phases of insect development, as well as the injury caused by them to the plants upon which they feed, was prepared for exhibit in the Japanese section at the Exposition, but on account of lack of space was not unpacked.

**Cases 13A, 13B, and 13C.**—The construction timbers of Japan.

This set of specimens is particularly interesting to the student, as each wood is accompanied by a portion of the bark, and by illustrations of the foliage and fruit.

**Wall.**—Among the specimens here exhibited is a comprehensive series of the commercial timbers of the country in plank, square, bark, and panel. Each species is accompanied by an illustration of the foliage characteristics similar to those in connection with the construction timbers. Many specimens representing their utilization may be seen. At the south end are three native paintings showing timber operations in Japan; these are particularly interesting on account of their similarity to those carried on in this country.

**Case 14.**—Standard mounted with the various species of bamboo cultivated in Japan.

Originally no bamboos grew on the islands of the Japanese archipelago, where they are now cultivated to a large extent, and rendered, by husbandry processes, very straight, firm, and useful. The red and brown colorations, spots, ridges, blotches, and other beautifying marks upon these bamboos are also the result of careful and studied cultivation of various fungi parasitic upon them.

**Cases 15A, 15B, and 15C.**—The Cabinet Woods of Japan.

**Case 16.**—Minor Forest Products: Starches, Pyroligneous Acid, Fossil Boards, and Charcoal, accompanied by explanatory labels and water-color drawings.

**Cases 17A, 17B, and 17C.**—Minor Forest Products: Edible Mushrooms, Waxes, Lacquer and Camphor.

In this case probably the greatest interest lies in the careful consideration of the lacquer industry, which is well represented by water-color drawings and the product itself. The same may be said of the camphor industry, which is similarly and as carefully shown.

**Case 18.**—Standard of Toko Posts.

The *Toko* is the ornamental place of honor in the Japanese parlor. It is here that ceremonial tea is served. This place is dear to the heart of the Japanese hostess, and is generally furnished in the height of Japanese neatness and artistic taste. These posts are placed to support a canopy overhead, and are always of some natural unhewn wood, often decorticated, or partially so. The woods chosen for *toko* posts are generally those of high commercial value and especial rarity.

**Cases 19A, 19B, 19C.**—Grains and Minor Forest Products.

In this case will be found most of the species of rice of Japan, both natural and whitened; tan barks, dyes and fibrous barks; also the woods used in the manufacture of paper, together with paper pulp from same.

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## BRITISH INDIA.

**Cases 20, 20A, and 20B.**—The Fibers and Minor Forest Products of India.

**Wall.**—The wall in this section is wainscoted with various species of the commercial timbers of the country, in the center of

which is a beautiful *padouk* doorway, and carved blackwood stands for jardinières. Along this wall may also be seen blocks of Teakwood, famous as ship building material.

**Case 21.**—Minor Forest Products, lacs and dyes.

**Stand 22.**—A single circular piece of *padouk* board, six feet eight inches in diameter, suitable for a table top.

**Stands 23 and 23A.**—Logs of Commercial Woods.

Notable among these are satin-wood and sandal-wood. Photographs of teak plantations and the cutch industry.

## CEYLON.

**Cases 24A and 24B.**—The Commercial Woods of Ceylon.

This case also contains many Ceylon products, both of forest and field. Starches, oils, gums, etc.

## JOHORE.

**Cases 24C, 24D, 24E, 24F, 24G, and 24H.**—The woods of Johore, commercial and non-commercial, together with the minor forest products of the country.

Notable in this case is anatto seed, oil and paste, so extensively used in the United States in the coloration of butter and cheese.

**Case 15.**—The Rattans and Medicinal Plants of Johore.

**Standard 25A.**—The Commercial Rattans of Johore.

## GALLERIES OF THE WEST COURT.

The four cases, partially installed, are to contain economic monographs as follows:

The Cotton Plant and its Utilization. Representing the growth of the plant from the seed to the boll, especially at its different periods of cultivation; the gathering and ginning of the cotton; the extraction of oil from the seed, and the utilization of the same together with the refuse; The extraction of rubber from the oil; the utilization of the lint in various manufactures, and the production of medicinal agents from various portions of the plant.

The Plants of Habit, showing the products and utilization of the various plants used by man in the perpetuation of narcotic and other habits, such as tobacco, opium, hashish, betel, cocaine, alcohol, etc., etc.

The Migration of Plants. Illustrating the most characteristic methods afforded by nature, in the form and character of the fruits of plants, for the perpetuation and dissemination of the species.

Peculiar Plant Foods. Illustrating by specimens many of the most interesting of the odd native plant foods.

Rubbers and Gums. Specimens showing the various rubbers produced by different plants, and the utilization of the product.

### SIAM AND JAVA.

**Case 16.**—Siamese and Javanese Plant Economics. Many curious and noteworthy products are represented, among which will be found gamboge, spiral and zig-zag bamboo, and edible birds-nests.

Products of the black sugar-palm of Java, and various seeds and cereals of Turkestan are also shown in this case.

### TURKEY.

**Case 17.**—The Woods of Turkey. Even the casual observer will note here the striking resemblance between these woods and those of our own country; particularly is this true of the pine, cedar, oak, ash, cherry, and sycamore.

### SPAIN AND CUBA.

**Case 17A.**—The Woods of Cuba, principally cultivated species.

**Case 18.**—Economic Plant Products. Especially interesting is the large comparative collection of olive oils, representing the products of various provinces and years.

### LIBERIA.

**Case 28A.**—Minor Forest Products, Oils, Calabar Beans, etc.

## NEW SOUTH WALES.

**Wall and Standard 29 and 29A.**—The principal timbers of the country, exhibiting excellent specimens of their cedar, rose-wood, beech, and several species of *Eucalyptus* or gum.

Tan Barks and Paving Blocks of New South Wales.

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## SOUTH SEA ISLANDS.

### Case 30.—Sea Fruits.

This designation is given to various odd and curiously shaped fruits cast by the waves upon the beaches of the Pacific Islands, where they are gathered principally by sailors attached to whaling vessels. The most notable among these fruits is the "Coca de Mer," the largest known fruit tree, curious both on account of its shape and size.

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## PARAGUAY.

### Case 30A.—*Maté* or *Yerba*. Paraguay Tea.

The source of *Maté*, the principal drink of South America, is the roasted and powdered younger leaves and twigs of a forest tree belonging to the Holly family.

The beverage is prepared in the same manner as tea is "drawn," and is drunk in hot infusion. Great care is taken, however, to thoroughly strain the liquor, in order that no portion of the powder shall be swallowed. Properly prepared *Mate* forms a pleasant and slightly stimulating morning drink, which may be taken clear, or with sugar or milk, or both.

**Platforms.**—Upon the platforms of the three Sections devoted to this country may be found an excellent collection of its principal timbers, the largest and most complete in existence; notable species are *Lignum Vitæ*, *Incense Cedar*, *Quebracho*, and a particularly fine specimen of *Orange Mulberry*.

A complete collection of dyeing and tanning barks, fiber plants, charcoals, and curious llanos may be seen upon the shelves and walls.

### Cases 31 and 31A.—Medicinal Plants of Paraguay.

**Cases 31 B and 31C.**—Fiber Plants. This collection is particularly rich in *Bromeliads*.

**Cases 32 and 32A.**—Economic and Medicinal Plants.

**Case 34.**—Paraguayan Seeds, Cereals, and Oils.

## BRAZIL.

**Case 34A.**—The Woods of Santa Catharina and Espiritu Santo.

Though the specimens in these collections are small, they represent a very complete and highly valuable series, and are especially useful for study, and comparison with the other states of Brazil.

**Walls and Center-Piece.**—Commercial Woods of Brazil.

The color forms of the Brazilian "Pine" (*Araucaria*) here exhibited compare well with the useful forms of *Cryptomeria* of Japan—forms, it is true, that are due to diseased conditions, but highly ornamental and useful. The beautiful *Pao Amaillo* cannot fail to attract and please. This species will doubtless be largely exported in the future, as it has attracted very favorable notice here.

**Case 35.**—The Woods of Pernambuco.

**Case 35A.**—Woods of Ceará.

**Wall.**—The Woods of Paraná.

This set is one of the most complete and uniform wood collections sent here from Brazil, and represents a large outlay of time and money.

**Cases 36 and 36A.**—Bast Fibers.

Notable in this case is the wonderful "natural oakum," a bast that requires but slight preparation to fit it for the calking iron.

**West Wall.**—The Woods of Minas Geraes and Para.

A large and valuable set of trunk specimens, notable among which are rosewood, snakewood, violet, and the indispensable Brazilian cedar.

**Cases 37 and 37A.**—Medicinal Plants.

Brazil is especially rich in medicinal plants. It is from this country that many of our most useful plant medicines are derived; notably, sarsaparilla and copaiva.

**Cases 38 and 38A.**—Rubber.

The principal product of Brazil, next to coffee and sugar, is the so-called India Rubber, for which the Amazon and its tributaries are famous. Seventy-five percent. of the product is exported

to the United States. Nearly all forms of the raw material may be seen in the collection.

**Cases 39 and 39A.**—Medicinal Plants, and Oils.

**Cases 40 and 40A.**—Textile Fibers.

This collection is particularly rich in Palm Products.

**Cases 41 and 41A.**—Gums, Resins, Seeds, and Cereals.

**North Wall.**—The Woods of Maranhao.

## ECUADOR.

**Cases 42 and 42A.**—Ecuador Products.

**Case 43.**—Seeds, Gums and Medicinal Plants.

Two cases containing specimen woods of Ecuador may be found on the transept of the North Gallery.

## COLOMBIA.

**Case 43A.**—Minor Forest Products.

**Wall.**—A series of Colombian Woods.

## VENEZUELA.

**Wall.**—Woods.

This collection, though composed mostly of small specimens, is particularly valuable in that nearly all of the species are authentically identified. It is also a quite complete series, and one of great scientific value.

**Case 44.**—Fibers, Cottons, Cereals, and Barks.

## BRITISH GUIANA.

**Case 44A.**—Gums, Oils, Starches, and *Cassava* bread.

**Wall.**—The Woods of British Guiana.

This collection contains many richly colored and valuable timbers, among which the *wallaba*, green heart, purple heart, and mahogany are especially deserving of careful comparison with the cabinet timbers of any country.

## TRINIDAD.

**Wall.**—The Woods of Trinidad excited the most favorable notice of any displayed at the Exposition, both for their beautiful

markings, and high permanent color. The magnificent *Saman*, or leopard mahogany, was by far the finest specimen in the Forestry Building, while the *angelin* and purple heart were wonderful examples of high color in wood. This collection forms one of the brightest color spots in the galleries.

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### CURACAO.

**Case 47.**—Economic Plants, Fruits and Woods.

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### GUATEMALA.

**Case 47A.**—Cereals, and Legumes.

**Wall.**—The Woods of Guatemala.

**Cases 47B and 47C.**—Fibers and Cottons.

**Case 48.**—Guatemalan Forest Products.

**Case 48A.**—Cereals, Legumes, Gums and Resins. *Chicle* from the juice of the *sapote* tree, the base of most modern chewing gums, may be seen here and in Case 52.

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### JAMAICA.

This collection is particularly rich in Starches—Arrow-root, Mandioca, and Banana meal being excellently represented.

**Wall.**—The Woods of Jamaica.

An excellent and very complete collection of the principal woods of the island.

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### MEXICO.

**Cases 50 and 51A.**—Mexican Seeds, Cereals, Gums and Oils.

**Wall.**—This space is designed for the Timbers of Mexico, of which the Museum secured a large and complete set, now in preparation for installation.

**Cases 52 and 53A.**—Mexican Textiles.

**Cases 54 and 55A.**—Medicinal Plants of Mexico.

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### DESTRUCTIVE DISTILLATION OF WOOD.

**Case 53.**—Monographic set. This set includes almost all of the products of the destructive distillation of the Beech and Birch;

notable among which are creosote, acetic acid, methyl alcohol, benzol, benzine, and oil of birch.

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## GALLERIES OF THE NORTH COURT.

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**Case 54.**—Insects injurious to the paper pulp tree. A complete and very interesting monographic collection of the insect enemies of the spruce tree of Europe, showing the mutations of each species, and examples of the injury wrought by them.

On the two lower shelves are arranged the various forms of carbolic acid and its compounds with different metals.

## ECONOMIC PLANTS.

**Cases 55 to 59A.**—Tobacco. These cases contain nearly four hundred samples of American grown tobaccos, from almost every producing district of the United States. A very complete and highly important comparative collection, both from the standpoint of the student and of the merchant.

## COTTONS.

**Case 60.**—Texas and Arkansas cottons.

**Case 60A.**—Arkansas and Tennessee cottons.

**Case 61.**—Mississippi and Louisiana cottons.

**Case 61A.**—Louisiana and Texas cottons.

**Case 62.**—Virginia and North Carolina cottons.

**Case 62A.**—Georgia and South Carolina cottons.

**Case 63.**—Georgia cottons.

**Case 63A.**—Alabama and Mississippi cottons.

**Case 64.**—Georgia, Florida, Oklahoma, Tennessee and Missouri cottons.

## FIBERS.

**Case 65.**—Ramie.

**Case 65A.**—*Abutilon*, Okra, *Asclepias*, and Indian Hemp.

**Case 66.**—Manila Hemp, Ixtle and *Yuca*.

**Case 66A.**—Bow String Hemp, Saw and Cabbage Palmetto.

**Case 67.**—Flax Plants.

**Case 68.**—Florida Sisal.

**Case 68A.**—Mexican Sisal, False Sisal.

**Case 69A.**—New Zealand Flax.

**Case 69B.**—Louisiana Cane Fiber.

**Case 69C.**—Pineapple Fiber.

**Case 70.**—Spanish Moss, Cypress Bark, Raphia, and Grass.

**Case 71A.**—Intermixed Ramie and Silk.

**Case 71B.**—Dressed Flax.

**Case 71A.**—Ramie Yarns, natural and dyed.

**Case 72.**—Saw Palmetto and African Fiber.

**Case 72A.**—Cocoanut and Pine-Needle Fibers.

**Cases 73 and 73A.**—Flax, Dressed and undressed.

### SYLVA OF THE UNITED STATES.

**West Wall.**—A nearly complete collection of the Leaves, Fruits, and Woods of the trees of our country, accompanied by graphic maps showing the distribution of each species. This fine collection is arranged systematically, and affords an excellent opportunity for comparison between allied woods. The richness of our sylva in oaks and conifers is strikingly exemplified.

**Cases 74 to 78A.**—A set of twenty monographs of North American trees. Each species in this set is illustrated by a large distribution map; photo-micrographs of three sections of the wood, horizontal, tangential, and radial; a branch in full leaf and fruit; microscopic sections of the wood in three planes, and a section of trunk showing the bark.

**Standards 79 and 79A.**—Specimens of Pine, showing the method of tapping for turpentine.

**Case 80.**—Indurated fiber ware. Examples, crude and finished, of the method of converting spruce wood into various household articles.

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### GALLERIES OF THE EAST COURT.

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**Case 81.**—Paper pulp. Crude and partially manufactured specimens, showing the utilization of spruce wood in the manufacture of all grades of paper.

**Cases 81 and 83.**—Timber tests. Standards representing the results of strain upon various species of American timbers.

### MONOGRAPHS OF AMERICAN TIMBER TREES.

The wall spaces between cases 81 and 86 are in process of installation with groups representing the various more commercial

timbers of North America. These monographic groups are being finished as rapidly as proper curing of the specimens will permit. The scheme is to represent each species by the following grouped specimens:

1. A branch from the tree, in leaf, with the flowers and fruits, and an authentic piece of wood *from the individual furnishing the branch*.
2. A photograph of the tree in summer, showing its general form and character of growth.
3. A photograph of the identical tree in winter, showing its method of branching and general winter aspect.
4. A trunk section showing the bark and form characters; these trunks to be uniformly one-half the average size attained by the species.
5. A cross section of the same trunk, showing the character of the annual growth.
6. A large detail map of North America, upon which the range of the species is depicted in three grades of color, showing the principal, general, and limital extension of the timber.
7. A descriptive label, giving the characters and utilization of the species.
8. A large plank, plain sawed, showing the objective commercial character of the lumber.
9. Various fancy boards showing the cabinet forms of the species.

Between **Cases 86 and 87.**—Woods of Canada and California, also fine specimens of redwood burl, Washington pine and Kentucky yellow poplar. Beyond Case 87, at the end of the Section, may be seen four excellent examples of the principal timber trees of Alaska.

**Case 88.**—Cereals of the United States, with milling products illustrating their uses.

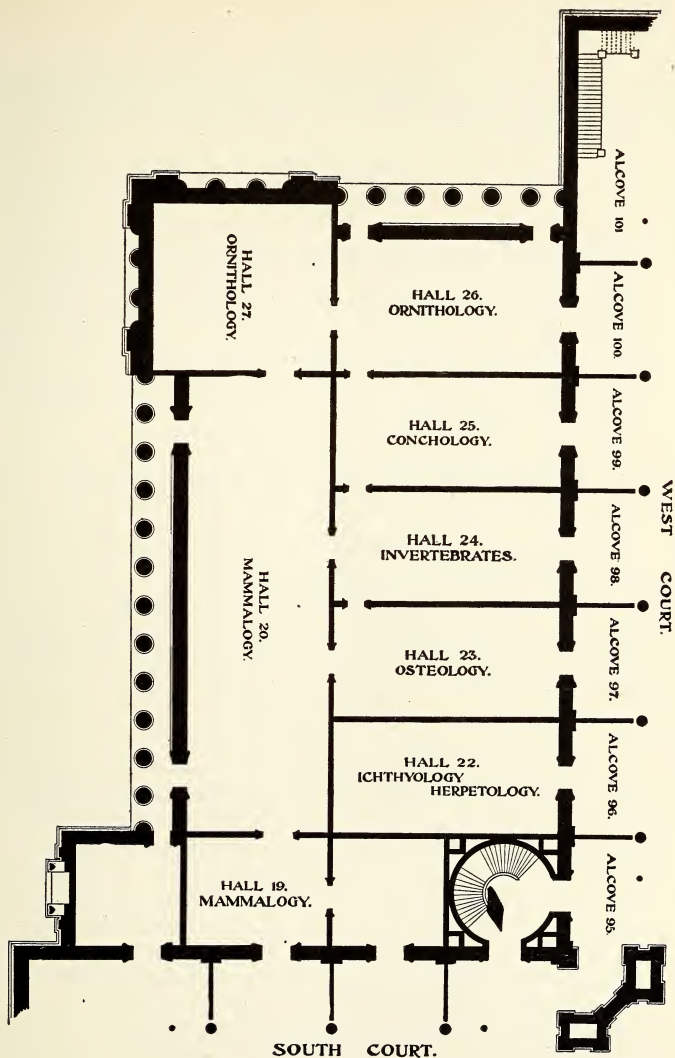
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## WALLS OF THE ROTUNDA.

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On the walls of the Rotunda will be found a framed set of Herbaceous Plants, each frame containing a family. They are arranged in their natural order, beginning on the west face of the northwest corner and passing southward. This collection serves to illustrate the grouping of plants according to their botanical characters.

On the floor of the north transept are three cases, two of Lichens and one of Mosses, each containing sufficient species to fairly represent the genera of these classes of plants.



PLAN OF DEPARTMENTS OF  
ZOOLOGY AND ORNITHOLOGY.



On the floor of the east transept is a case of replicas of tropical Fruits, accompanied in many instances by products gained from the different species.

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## THE HERBARIUM.

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The herbarium of this department is located in the north balcony over the main entrance to the Museum, and is open at all times, during business hours, to students of systematic phytology and ecology. The collections are large and particularly rich in the flora of North America, the West Indies and Mexico, and the genera *Salix*, *Euphorbia*, *Juncus* and *Carex*, with a generous amount of species of Europe, Asia, and Africa.

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## DEPARTMENT OF ZOOLOGY.

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The collections in Zoology occupy Halls 19, 20, 22, 23, 24, 25, 26, 27, the West Court and its Alcoves on South side, and the South Court and its Alcoves on West side. Of these halls and alcoves, the Department of Ornithology occupies Halls 26 and 27, and Alcove 100, and the collections found there will be described on page elsewhere.

### WEST COURT.

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Excepting the group of Musk Ox, it is intended that this court shall be filled with groups of large mammals collected by the Museum's East African Expedition, in 1896. The few cases now in this court, and not belonging to this collection, will sooner or later be replaced by those whose positions they occupy. These groups were all mounted by Mr. C. E. Akeley, the taxidermist of the Museum. In the middle of the east end of this court there is suspended from the roof of the building the skeleton of a North Atlantic right whale (*Balana biscayensis*). This skeleton has a length of 44½ feet.

Just below this skeleton is a group of Musk Ox. (For a description of this and other groups in the West and South Courts see labels in each case).

Beginning at the East end of this court and going down the

North side is a row of large cases whose contents are as follows :

A group of Cheetah, or Hunting Leopard, Somaliland, East Africa.

A group of Proboscis monkeys, Borneo.

A group of Beisa Antelope, East Africa.

A group of Orang-utans.

The case at the west end of the court contains a group of the Big Koodoo, East Africa.

Running from the west to the east end on the south side of this court is a second row of large cases whose contents are as follows:

A group of Spotted Hyena, Somaliland, East Africa.

A Pacific Walrus.

A group of Somaliland Wild Ass, Somaliland, East Africa.

A group of the Lesser Koodoo, Somaliland and Ogaden, East Africa.

A group of Waller's Gazelle, Somaliland, East Africa.

A group of Striped Hyena, East Africa.

#### ALCOVES WEST COURT.

**Alcove 95.**—Male Elephant and young.

**Alcove 96.**—Loggerhead Turtle and Leatherback Turtle; jaws of Bottle Nosed and Sperm Whales.

**Alcove 97.**—See page 96.

**Alcove 98.**—Rhinoceros, Guar Ox; models of Grampus, Porpoises, etc.

**Alcove 99.**—Mounted male Wapiti and Giraffe.

**Alcove 100.**—See page 99.

#### SOUTH COURT.

In the center of this court is a group of Pumas. The case on the West side contains five Seals and the Sea Elephant from the Kerguelen Islands.

The case at South end contains Llamas, Alpaca and Vicugna.

The case on the east side contains a male, female and young of the northern Fur Seal, and a Steller's Sea Lion from the Pacific Coast.

The case at the north end contains a group of Mountain Sheep.

In the four corners of this court and under the gallery at north end are arranged table cases one to twenty containing shells. The remaining cases containing shells are in room 25, for an account of which see page 91.

### COLLECTION OF MOLLUSKS.

The collection of *Molusca* contains some 7,000 species or more. It is believed to represent fairly well the subject of conchology. The collection is shown in thirty-two table cases, one to twenty being in the south court, twenty-one to thirty-two in hall 25. In the arrangement of the families Dr. Paul Fischer's classification has been followed in its reverse order.

**Case 1.**—This case contains a small collection of Brachipoda, these are not Mollusca though in external form they resemble the Lamellibranchiate shells. The Brachipods were very numerous in earlier geological times. The *Mollusca* proper follow the Brachipods in Case 1, the important families represented are the Anatinidae, Pandoridae, Tellinidae and the Teridinidae (Ship Worms) piddocks, etc. Also examples of injury done submerged wood by the ship worms.

**Case 2.**—*Pholadidae* (Burrowing Shells); *Myidae*; *Solenidae*; (Razor Shells) *Psammobiidae*.

**Case 3.**—*Donacidæ* (Wedge Shells); *Veneridae*, a very large family which contains many beautiful shells.

**Case 4.**—*Veneridae* continued; *Chamidae*; *Cardiidae* (Cockle Shells.)

**Case 5.**—*Cardiidae* continued: *Tridacnidae* (Giant Clams.) Two very large examples of this family can be seen in hall 25: *Unionidae* (River Mussels.)

**Case 6.**—*Unionidae* continued. In this case is represented a collection of pearl-bearing shells from Wisconsin, also a number of pearls.

**Case 7.**—*Unionidae* continued; *Arcidae* (Ark Shells.)

**Case 8.**—*Mytilidae* (Mussels); *Aviculidae* (Wing Shells), this family includes among other species the "Pearl Oyster," of which specimens are here shown.

**Case 9.**—*Pectinidae* (Scallop Shells); *Spondylidae* (Thorny Oysters.) These two families contain many shells which are interesting on account of their forms and their brilliant colors.

**Case 10.**—*Spondylidae* continued; *Ostreidae* (Oysters); *Dentaliidae* (toothed-shells); *Chitonidae* (Chitons); *Patellidae* (Limpet Shells.)

**Case 11.**—*Patellidae* continued; *Fissurellidae* (Keyhole Limpets); *Haliotidae* (Ear Shells Ablone); *Trochidae*.

**Case 12.**—*Trochidae* continued; *Turbinidae* (Top Shells), *Neritidae*.

**Case 13.**—*Neritidae* continued; *Naticidae*; *Xenophoridae*.

**Case 14.**—*Calyptraeidae* (Limpets); *Ampullariidae* (Apple Snails) *Littorinidae* (Periwinkles.)

**Case 15.**—*Melaniidae*; *Turritellidae*; *Vermetidae* (Worm Shells, the shells being more or less contorted like worm tubes), *Cerithidae*.

**Case 16.**—*Strombidae* (Conch Shells); *Cypraeidae* (Cowries), a family containing some of the most beautiful shells known.

**Case 17.**—*Doliidae* (Tun Shells); *Cassidae* (Helmet Shells); *Tritonidae* (Triton Shells.)

**Case 18.**—*Tritoniadae* continued; *Muricidae*, a large family of mostly spiny and roughened shells.

**Case 19.**—*Muricidae* continued; *Nassidae* (Dog Welks); *Bucinidae* (Welks) *Turbinellidae*.

**Case 20.**—*Turbinellidae* continued; *Fasciolaridae*; *Fusidae* (Spindle Shells); *Mitridae* (Mitre Shells.)

**Case 21.**—*Volutidae*, a family containing many large and beautifully colored shells; *Marginellida*; *Harpidae* (Harp Shells.)

**Case 22.**—*Olividae* (Olive Shells); *Conidae* (Cones), an extensive family living mostly in warm seas.

**Case 23.**—*Conidae* continued.

**Case 24.**—*Teribridae* (Augur Shells); *Bullidae*.

**Case 25.**—Materials illustrating two groups of mollusks, many of whose members have the shell rudimentary or wanting entirely. Many of these animals are represented here by beautifully executed glass models; *Limnaeidae*.

**Case 26.**—*Stenogyridae*.—This family and the remaining ones, which belong to the order *Pulmonata*, are air-breathing mollusks, the largest belonging to the genus *Achatina*. Most of the species live in Africa where they remain in trees, descending to lay their eggs. Some of the eggs are exhibited. *Pupidae*.

**Case 27.**—*Pupidae* continued; *Bulimidae*.

**Cases 28, 29 and 30.**—*Helicidae* (Air Breathers), a large

family containing over 6,500 species. Many of the most attractive specimens in these cases are from the Phillipine Islands. Some species of *Bulimus* reach a length of six inches. They lay large eggs which resemble those of birds, some of these are shown.

**Case 31.**—*Testacellidae*, *Limacidae* (Slugs), a few families of *Pteropoda*.

**Case 32.**—The *Cephalopoda*, a class which includes the Nautilus, the Squids, the Octopus and Argonauts. Specimens of a number of species in alcohol are in Case 2 in Hall 24. A few of the soft Cephalopoda are represented by means of glass models. A model of the Giant Squid of the coast of New Foundland is suspended overhead. In Hall 24 is a model of the Giant Octopus of the Pacific Coast of the United States.

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## HALL 19.

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### MAMMALS.

**Case 1.**—Four representatives of the lower sub-class of mammals, the *Prototheria*. Of these the most interesting is the Duck-bill (*Ornithorhynchus*). It is so-called on account of its duck-like beak. It is a native of Australia. It is aquatic in its habits and swims with facility. Although a true mammal, the remarkable fact has been discovered that it lays eggs instead of producing living young. The *Echidnas*, or Spiny Ant-eaters, are inhabitants of New Guinea, Tasmania and Australia.

This case also contains members of the second sub-class of mammals, the *Metatheria*, order *Marsupialia*. These comprise the Phalangiers, the Bandicoots, the Kangaroos, the Dasyures, all inhabitants of Australia, Tasmania and New Guinea, and the Opossums, dwellers in the Americas. They present many strange and interesting forms of life. The Phalangiers usually live in trees and have prehensile tails. Some species subsist on vegetation, others on insects. The "flying phalangiers" resemble our flying squirrels, in having a fold of skin which acts as a parachute. The Bandicoots (*Perameles*) burrow in the earth and subsist on roots and grain. The Kangaroos are grass-eating animals. The Dasyures are devourers of flesh. All the other animals belong to the sub-class *Eutheria*, and are continued in Case 2.

**Case 2.**—Contains *Edentates (Bruta)*. Among the Edentates shown are Armadillos, the strangely armored Pichiciago from the Argentine Republic, two species of Sloth, several species of Ant-eaters and two species of Scaly Ant-eaters or Pangolins, from Africa. The Armadillos have most of the skin converted into an armor of bony plates. They live on roots, insects, reptiles and carrion. They are able to burrow with astonishing rapidity. The Pichiciago is a very rare burrowing animal. The Great Ant-eater lives on white ants, whose dwelling it tears open with its strong claws. The Pangolins have the body covered with overlapping horny plates. They subsist on ants.

This case also contains two representatives of the Sirenia. These are aquatic herbivorous animals which, in external form, resemble the whales. They have, however, no close relationship with the latter animals. The uppermost specimen is the American Manatee, or sea-cow, a resident of Florida. The lower specimen is the Dugong from Australia.

**Case 3.**—Hogs and Peccaries. The Peccaries here shown go in small herds of eight to ten, and are not as pugnacious as is another species found in South America. This case also contains three interesting species of deer, the Muntjac; the little deer, *Cervus steerii*, the type of its species; and the Sambur of India.

**Case 4.**—Female Wapiti; The male of this species is in Alcove 99, West Court.

**Case 5.**—Reindeer and its close relative, the Caribou, from Maine. These are the only deer the females of which have well developed horns.

This case also contains the female Moose.

**Case 6.**—The male Moose.

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## HALL 20.

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**Case 7.**—Several species of deer, including the Pronghorn, or American Antelope.

**Case 8.**—Two species of Antelope from British East Africa—Lichtenstein's Hartebeest, and Coke's Hartebeest.

**Case 9.**—The Sassabye.

**Case 10.**—Two species of Gnus, the White-tailed Gnu and the White-bearded Gnu.

**Case 11.**—Salt's Dik-Dik, Eastern Abyssinia; Kirk's Dwarf antelope, British East Africa, a very small species of antelope, remarkable for its projecting and distensible snout, and for the tuft of hairs between the horns. It is said to frequent rocky hills. The case also contains the Indian antelope, the Palla, and the Water-buck.

**Case 12.**—The Indian gazelle, India; the Persian gazelle, and Grant's gazelle, Africa.

**Case 13.**—Contains a fine example of the Roan antelope, a stately animal from Africa.

**Cases 14 and 15.**—A number of goats and sheep from various regions of the world.

**Case 16.**—An example of the Musk-Ox, from Great Slave Lake and the Tamaroa, three specimens. The Tamaroa is one of the most generalized of the buffalos. It inhabits the Philippine Archipelago.

**Case 17.**—Old male, young male, cow and calf of the American Bison.

**Case 18.**—Malayan Tapir, Burchell's Zebra and Common zebra.

**Case 19.**—Grevy's Zebra, male and female, from East Africa.

**Case 20.**—Contains the gnawing animals (*Rodentia*). Among these are exhibited specimens of the Squirrels, Spermophiles, Rats, Mice, Muskrats, Beavers, Hares, Rabbits, the Capybara, Chinchillas and Porcupines. The Capybara is the largest living rodent. It is the prey of the Jaguar. The Chinchilla (*Lagidium*) here shown is not the true Chinchilla so prized for its soft fur. The Porcupines are remarkable for their long sharp spines. They are not able to shoot these out at their enemies.

**Case 21.**—In this case begins the extensive order of flesh-eating animals (*Carnivora*). In the upper division of the case are exhibited several species belonging to the interesting family of cats; in the lower portion are Lions and Tigers, a male and female of each.

**Case 22.**—Specimens of two species of Hyenas, and several species of Dogs and Foxes.

**Case 23.**—Three Grizzly Bears, two adults and one young. In this case are also exhibited the Polar Bear; species from the Himalayas and Japan, and the Sun-bear from Borneo.

**Case 24.**—The upper portion of this case contains the *Procyonidae* (Raccoons, Panda, etc.) and the lower species which belong to the large family of *Mustelidae*. Among the interesting forms are the Otters, Sea-otter, the Skunks, Badgers, Martens, the Glutton, etc.

The Minks, Wolverine, etc., are in the lower portion of Case 25, in the upper part of which are displayed the *Insectivora*, among which are found the strange Tenrec (*Centetes*) of Madagascar, the Solenodon from Cuba, the Hedge-hog, the Shrews, the Moles, and the so-called Flying Lemur (*Galeopithecus*) from Sumatra.

**Case 26.**—In the south half of this case are *Chiroptera* (bats), among which are some large and remarkable species. The larger species belong to the family of Fruit-bats, living on fruits and the juices of plants. The smaller bats subsist mostly on insects.

In the south half of this case, and in Case 27, are representatives of the order *Quadrupedia*, containing the Lemurs, Monkeys and Chimpanzee. Some twenty-seven species are here shown. There is a case of Orangs and another of Proboscis monkeys exhibited in the West Court.

## HALL 22.

### FISHES AND REPTILES.

In this Hall are representatives of the cold-blooded vertebrates or vertebrate-like animals which are included in the following classes: *Tunicata* (the Ascidians); *Leptocardii* (the Lancelets); *Marsipobranchii* (the Lampreys); *Pisces* (the Sharks Rays and the true fishes); *Batrachia* (Salamanders Frogs, Toads, etc.); *Reptilia* (Snakes, Lizards, Turtles, etc.)

The first four classes are represented in the six cases in the north half of the hall, the remaining two classes are in the three cases in the south quarter of the hall, while the remaining two cases contain animals too large to be placed in the other cases where they properly belong.

**Case 1.**—This case contains some material representing the group of Ascidians (*Tunicata*). It consists almost wholly of glass models. There is also a small amount of material belonging to the *Leptocardii* and the *Marsipobranchii*.

**Cases 1 to 6.**—The true fishes begin in Case 1. As far as possible they are arranged in systematic order, beginning with the *Selachii* (Sharks) and ending in Case 6 with the *Pediculati* (Bat-fishes, etc).

**Cases 7 and 8.**—Contains fishes and reptiles too large to be placed in cases where they properly belong. The labels indicate their position in the series.

**Case 9.**—*Amphibia*. The collection of amphibians is small, and is arranged in the upper portion of this case. Only two forms are represented, *Gradientia* (the Salamanders) and the *Salientia* (the Frogs, Toads, etc.)

The *Reptilia* also begin in this case and are continued in Cases 9, 10 and 11. The living orders are represented; *Rhynchocephalia*, embrace the New Zealand, Tuatera; *Squamata*, containing the Snakes and Lizards; *Chelonia*, Turtles; and *Crocodylia*, Crocodiles, Alligators, Gavials. Among the conspicuous reptiles exhibited are the Alligators, the Cayman, the Gavial, the large specimen of the Lace Lizard (*Varanus*), the Pythons, etc.

#### HALL 23 AND ALCOVE 97.

The Osteological collection consists of mounted skeletons of over 225 species. These belong to over fifteen orders and thirty families. It affords an excellent means for the study of the vertebrates.

**Case 1.**—Occupies the west side of alcove 97, and contains the skeletons of cold-blooded vertebrates.

**Case 2.**—In hall 23. Contains skeletons of the Ostrich, Emu, and the Rhea.

**Case 3.**—The remainder of the birds. The rest of the cases contain the skeletons of mammals, the arrangement corresponding to that of the mammals in halls 19 and 20, viz: beginning with the Prototheria and ending with the Quadrumana. In the middle of hall 23 are skeletons of the Giraffe, Elephant, Hippopotamus and the Rhinoceros; in the middle of alcove 97 the Camel and Wapiti.

#### HALL 24.

##### SPONGES, JELLY FISH, CORALS, ETC.

In this hall are exhibited the materials illustrating the branches of the animal kingdom known as the *Protozoa*, the *Porifera*, the *Caelenterata*, and the *Echinodermata*.

**Case 1.**—In the south end of this case are a few specimens of the lowest forms of animal life. The *Protozoa* almost wholly animals of microscopic size. These are illustrated by models, faithful representations of these animals magnified 2,300 times.

Next in order are the *Porifera*, or Sponges. These include some interesting forms such as Neptune's cup, the Class-rope Sponge, Venus' flower basket, etc.

Near the sponges begin the *Coelenterata*. This branch includes the Hydroids, the various forms of Jelly-fishes, the Sea Anemones and the Corals.

The Hydroids and Jelly-fishes, are represented by a number of glass models. These include one of the Portuguese Man-of-war.

The remainder of Case 1 is occupied by the *Actinazoa*. A few of these, the Sea-anemones, form no solid skeleton and are represented here principally by glass models.

Of the Corals which form a solid limestone skeleton there are two orders, viz: the *Zoantharia* and the *Alcyonoida*. All the solid corals shown in Case 1 and the north half of Case 2 belong to the first named order.

The second order of Corals, the *Alcyonoida*, shown in the south half of Case 2, includes the Sea-fans, the Sea-whips, Organ-pipe Coral, etc.

#### **Crinoids, Star-Fish, Sea-Urchins, etc.**

**Cases 3 and 4 and Table Cases.**—The class of animals designated by the *Echinodermata* (having a prickly covering) includes the *Crinoidea* (Sea-lilies, etc.,) the *Ophiuroidea* (Brittle-stars and Basket Fishes), the *Asteroidea* (Star fish,) *Echinoidea* (Sea-urchins), and the *Holothuroidea* (Sea Cucumbers.) These are exhibited in the wall-cases 3 and 4, and in table-cases 5, 6, 7, 8, 9, 10, 11, and 12. The series begins with table-case 5.

**Case 5.**—Here are shown the lowest forms of the class the *Crinoidea*. In wall-case 3 are shown some alcoholic preparations.

In Case 5 are also exhibited the *Ophiuroidea*, some of which are known under the names Brittle-stars and Serpent-stars; others as Basket-fishes.

**Cases 6, 7, 8 and part of 9.**—Specimens of the order *Asteroidea* (Star fishes). The simplest form of these animals is a central disk passing gradually into five arms; but there are extreme

modifications of this pattern. The arms may be more numerous and very long and very short. The five arms may form simply the angles of a pentagon, or they may form the greater portion of the animal. Some of the larger species are exhibited in wall-case 4.

**Cases 9, 10, 11 and 12.**—In case 9 begin the *Echinoidea*, or Sea-urchins. The skeleton of all these consist of ten zones of plates closely joined and forming a sort of box. On the outer surface of this is an armature of spines. The form of the animal varies greatly, some being globular, some slightly flattened, others, as the "sand-dollars," extremely so. The spines undergo strange modifications.

In the south end of case 12 are exhibited a portion of the *Holothuroidea*, or Sea-cucumbers. Several alcoholic examples of these will be found in wall-case 3.

In case 12 are also found a few worms and a few species of the *Polyzoa*. Others of both groups are contained in wall-case 3.

Overhead in this room is suspended a life-size model of the enormous *Octopus*, or Devil-fish, which occurs on the coast of California.

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## HALL 25.

### INSECTS, CRUSTACEANS AND MOLLUSKS.

**Case 1.**—Collection of Crustaceans. In the south end are a few Cephalopods. The glass models show several stages in the development of the Lobster.

**Case 2.**—A collection of about 2,000 Butterflies and Moths.

This hall also contains shell cases 21 to 32, for an account of these see south court, page 91.

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#### Study Collection.

The study collections of mammals, Fishes and Reptiles, consisting of thousands of specimens contained in tin air tight cases and glass jars, is located in the balcony over the south entrance, and is accessible during museum hours to those who may desire to study the material or compare specimens. Every attention is paid to this important adjunct to zoological material for the assistance of scientific investigation and it is hoped that they may eventually be ranked among the most important collections in the United States.

## DEPARTMENT OF ORNITHOLOGY.

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The exhibition series of specimens in this department occupy Halls 26 and 27 and the Alcove off the west court at the entrance to Hall 26, which should be made the starting point to study these collections.

In the alcove entrance to Hall 26 (No. 100) are placed two cases containing a collection of the nests and eggs of native and exotic birds.

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### HALL 26.

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#### GENERAL ORNITHOLOGY.

At present there are something over 600 mounted specimens representing about 540 species. These species illustrate the leading characters of about one hundred families which are arranged and classified in systematic order beginning with the Grebes *Podicipidae* and ending with the Thrushes *Turdidae*.

#### Wall Cases.

**Sec. 1.**—The South American ostrich.

**Sec. 2.**—The emu of Australia.

**Sec. 3.**—The cassowary, three species of the wingless, tailless Kiwi or Apteryx from New Zealand, tinamou from South America, and four species of penguin, a group whose members are confined to the Antarctic regions.

**Sec. 4.**—Grebes, auks, guillemots, gulls, terns, albatrosses, petrels, fulmars, etc.

**Sec. 5.**—Sheath-bills, plovers, turnstones, curlews, snipe, stone-plovers, and bustards.

**Sec. 6.**—Cranes, rails and horned screamers.

**Sec. 7.**—Ducks, geese and swans.

**Sec. 8.**—Flamingoes, ibises, storks.

**Sec. 9.**—Storks, herons, bitterns, etc.

**Sec. 10.**—Pelicans, gannets, cormorants and snake-birds or darters.

**Sec. 11.**—A good example of the hoatzin, the only known representative of the order *Opisthocomi*. For several days after hatching, the young of this bird presents some characters more like a mammal than a bird, namely, the fore-limb is provided with toes and claws, which, however, are modified later and the fore-limb becomes normal. This section also contains quail, grouse and partridge.

**Secs. 12, 13, 14 and 15.**—Ptarmigans, guinea-fowls, pheasants, peacocks, turkeys, curassows, etc.

**Sec. 16.**—The pigeons.

**Secs. 17 and 18.**—Vultures, eagles, hawks and owls.

**Secs. 19 and 20.**—The parrots, parakeets and cockatoos.

**Sec. 21.**—The plantain-eaters and cuckoos.

**Sec. 22.**—Cuckoos, podargi, night-hawks, goat-suckers, rollers, etc.

**Sec. 23.**—The bee-eaters, motmots and kingfishers.

**Sec. 24.**—The hornbills.

**Sec. 25.**—The hoopoes, puff-birds, jacamars, toucans, barbets and woodpeckers.

**Sec. 26.**—The trogons, humming-birds and swifts, also the lyre-birds of Australia.

**Sec. 27.**—The broadbills, pittas, tyrant fly-catchers and cotingas.

**Sec. 28.**—Ant-thrushes, woodhewers, larks, wagtails and babblers.

**Sec. 29.**—The old World or true fly-catchers, the thrushes, swallows, cuckoo-shrikes and drongo-shrikes.

**Sec. 30.**—The waxwings, wood-swallows, shrikes, tits and nuthatches and the true orioles, a group not native to America.

**Secs. 31, 32 and 33.**—The bower birds of Australia, the long-billed and the typical birds of Paradise. Fifty specimens and twenty-five species give a good idea of the incomparable beauty of this group of birds.

**Sec. 34.**—The crows, jays and magpies.

**Sec. 35.**—The Old World starlings, the honey-birds and sun-birds, the latter of which are often referred to as the humming-birds of the Old World, then the creepers and honey-creepers and wood-warblers.

**Sec. 36.**—The tanagers, one of the most beautiful of the groups of strictly American birds; the weaver birds, American orioles and, lastly, the sparrows, finches and grossbeaks. These latter are the most highly specialized in the class birds.

#### CENTER CASES.

**Case A.**—A group illustrating the peculiar domestic arrangements of the rhinoceros hornbill during the breeding season.

**Case B.**—“A Surprised Mother,” representing a domestic hen as mother of a lot of ducklings that are represented as plunging into a basin of water.

**Case C.**—A group showing the nesting site and a pair of prairie chickens.

**Case D.**—A group of quail in various attitudes.

**Case E.**—A group of the American eider duck representing the male and female.

**Case F.**—A group of the American robin, showing the nest and eggs and the parent birds much excited by the approach of a black snake.

**Case G.**—A group representing a section of a pond with the shore line fringed with grass. A group of ducks are shown, some stand on the shore and others swimming about near the edge of the pond, while in the background, half hidden by the grass, a Florida lynx is seen stealing upon the unsuspecting birds. Three species of ducks are shown in this group: The pintail, lesser scoup duck and ring-necked duck.

**Case H.**—A group composed of an adult African ostrich, a chick and an egg.

**Case I.**—Winter scene in the far North illustrating the protective coloration of birds inhabiting high latitudes.

#### HALL 27.

#### NORTH AMERICAN ORNITHOLOGY.

Devoted exclusively to North American birds with an idea of giving special prominence to the ornithology of Illinois. The arrangement followed, that adopted by the American Ornithologists' Union in their check list of North American birds, begins

at the right hand, entering from Hall 26 and continues from right to left. The family groups being exhibited in vertical series in the various sections of the wall cases.

### WALL CASES.

**Sec. 1.**—The diving birds—grebes, loons and auks.

**Secs. 2, 3 and 4.**—The long-winged swimmers, jaegers, gulls, terns and skimmers.

**Sec. 5.**—The tube-nosed swimmers, albatrosses, fulmars and shearwaters and the totipalmate swimmers.

**Sec. 6.**—Gannets, darters, cormorants, pelicans and man'o-war birds.

**Secs. 7, 8, 9, 10, 11, 12 and 13.**—Ducks, geese and swans. Special attention is called to the fine pair of now extinct Labrador duck.

**Secs. 14, 15, 16 and 17.**—Flamingoes, spoonbills, ibises, the herons, egrets and bitterns.

**Sec. 18.**—The cranes.

**Sec. 19.**—The rails, gallinules and coots.

**Secs 20, 21, 22, 23 and 24.**—The shore birds—phalaropes, avocets, stilts, snipes, sandpipers, curlew, plover, turnstone and oyster-catchers.

**Secs 25, 26 and 27.**—The gallinaceous birds—the grouse, partridges and quail, the turkeys and the pigeons.

**Secs. 28, 29, 30 and 31.**—The birds of prey—the vultures, the falcons, hawks, buzzards, eagles, kites and owls.

**Secs. 32.**—The parrots; including two fine examples of the now very rare Carolina parakeet; the cuckoos and kingfishers.

**Sec. 33.**—The goatsuckers and swifts; the Tyrant flycatchers, larks, the crows and jays.

**Sec. 34.**—Blackbirds and orioles; finches, sparrows, juncos, buntings.

**Sec. 35.**—Tanagers, swallows, waxwings, shrikes, vireos and wood warblers.

**Sec. 36.**—The wrens, thrashers, creepers, nuthatches and tits, kinglets, thrushes and bluebirds.

### CENTER CASES.

In the center of Hall 27 is a group representing a "rookery" of the American egret.

### GALLERY.

The gallery of this hall contains the study collection of bird skins, all arranged in systematic order in dust and moth-proof cases.

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## DEPARTMENT OF ANTHROPOLOGY.

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**Nature and Purpose of Collections.**—The collections brought together in the Department of Anthropology are intended mainly to illustrate the more primitive or uncivilized phases of the development of the human race. There are two well-marked divisions of the subject, and the materials illustrating them are separately installed. One relates to man himself, to his physical and mental constitution and powers, and the other to the works of his hands, to the visible phenomena of culture.

The first division consists of apparatus used in studying the greatly varied physical phenomena, and of extensive collections of crania, casts and other objects, articles and materials, illustrating the physical characteristics of the race. These exhibits are arranged in the gallery of the East Court.

The second division comprises very extensive exhibits of the handiwork of man, which are placed on the main floor of the courts and the halls of the southeast section of the building.

The works of living or historic peoples, are for the most part, assembled according to the tribe or nation to which they pertain; those of prehistoric peoples are brought together in groups according to the locality from which they are derived, or to the people, time, or stage of progress they are thought to represent, or, otherwise, with reference to some other special subject to be illustrated.

The various groups thus indicated are placed in the halls in an order corresponding as far as possible with their original geographic relations. In this way the various objects and articles, and through them the people represented, are conveniently studied and compared. It is also possible, with this arrangement, to illustrate the striking and profound effect of environment—the local animal, vegetal and mineral resources and the varied geographic and climate conditions—upon the people and culture of each region.

Certain collective exhibits are brought together in separate

rooms to illustrate special subjects, or to facilitate comparative study in some important direction. This is exemplified in alcove 122, where numerous examples of religious art are assembled, and in Hall 1, which contains an exhibit of musical instruments.

**Origin of Collections.**—As to their origin the exhibits may be grouped in three principal categories: (1) collections made for the World's Columbian Exposition by its Anthropological Department and turned over to the Museum at the close of the Fair; (2) collections from various sources exhibited by the owners at the World's Fair, in the Anthropological building and elsewhere, and acquired by the Museum by gift or purchase; (3) materials not shown at the Fair, but acquired by gift, collection or purchase subsequently to the foundation of the Museum.

Of the first class the more notable are ethnological collections from Alaska, British Columbia, Canada, California and the Middle and Eastern States; casts of Mexican, Central American and Peruvian antiquities; and archeological collections from Ohio Mounds. Of the second class are a collection of North American ethnological material donated by Mr. Edward E. Ayer; the Hassler collection of featherwork and other ethnological specimens from the Indians of Paraguay; the Montez collection of Peruvian antiquities; the Wyman collection of copper implements and relics of stone from Wisconsin; the Gunning collection of idols; the Colombian collection of objects of gold, earthenware and stone; the Boas collection of skulls; the Riggs collection of archeologic material from the Southern States; the Johnson collection of reproductions of Irish antiquities; the Finsch collection from New Guinea; the Peace collection from New Caledonia; the Remenyi collection from South Africa; the Pogosky collection from Siberia; contents of a Chinese temple; the Green cliff house collection; the Javanese collection; the Lumholtz collection of ethnological objects from Northern Mexico; and various collections from Alaska. Of the third class are Pueblo models, pottery and quarry material donated by the Bureau of Ethnology and National Museum; Berlin collection of Egyptian casts; Harris collection of Peruvian antiquities; Bruce collection from Alaska; collection of Mexican antiquities donated by Mr. Allison V. Armour; the great collections of Mr. Ayer from Italy and Egypt; and the Keam collections from the ancient Pueblo region of Arizona.

**Placement of Collections.**—The Department occupies the North Court, the East Court, the east alcoves of the South Court, the southeast section of the main building, the southern series of halls of the northeast section, and the east and south galleries of the East Court.

The North Court is occupied mainly by collections illustrating the archeology of Europe.

The East alcoves of the South Court are devoted to reproductions of Central American antiquities.

The East Court and its alcoves contain groups of exhibits relating to North and South American archeology.

In Hall 10 are installed exhibits of musical instruments. Hall 9 is filled with Egyptian antiquities, and the rest of the halls on the north side (4, 5, 6 and 7) are occupied by collections illustrating the ethnology of Africa Asia and Pacific Islands.

The southeast section is devoted to the ethnology and archeology of America. Halls 10 and 11 contain collections from the Eskimo of Alaska, Labrador and Greenland. Hall 18 or Ayer Hall is devoted especially to the collections donated by President Ayer. These exhibits pertain largely to tribes of the great interior region. Halls 12 and 13 contain exhibits from the Northwest Coast, beginning at the southwest with South Alaska, and ending at the northeast with the State of Washington.

Halls 14, 15, are devoted to the ethnology of South America. Halls 16 and 17 are devoted to the ethnology of the Hopi Indians of Arizona. Halls 30 and 31 contain well selected exhibits illustrating the textile art, and Hall 33 is devoted to ceramics.

The physical laboratories, and collections illustrating physical anthropology, occupy the galleries of the East Court.

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## NORTH COURT.

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### EUROPEAN ARCHEOLOGY.

The central floor space of this court is devoted to European archeology, while the alcoves contain miscellaneous exhibits.

**Cases 1, 6 and 7.**—Contain the Johnson collection of reproductions of Irish antiquities, consisting of crosses, croziers, shrines, bells, harps, drinking-horns, vases and personal ornaments. This is justly regarded as a most remarkable and interesting collection—the reproductions having been made with the utmost care.

**Cases 2, 5, 8, 9, 10, 11, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25 and 26.**—Contain mainly Greek, Roman, Etruscan and Phœnician antiquities, a large part of the bronzes being reproductions from the originals now preserved in the Naples Museum. There are five cases of original bronzes, and in these are found some rare pieces; the bath tubs, table and vases found in a villa near Pompeii are among the most valuable specimens of their class known.

Of the reproductions, special attention may be called to the tables, braziers, chairs, etc., installed on pedestals in the court and alcoves. These collections were assembled by President E. E. Ayer during the years 1894, '95 and '96.

**Cases 3 and 4.**—Contain nearly two hundred examples of the exquisite glassware of the ancient Mediterranean nations. Much the greater number are credited to the Romans, whose influence and art extended over so many widely separated regions, but it is believed that a limited number of specimens are Phœnician. The uses were largely those of the toilet. The forms and sizes are varied, and the color is in many cases attractive and brilliant.

**Cases 14, 17, 20, 23, 27 and 28.**—These exhibits are mainly the contents of ancient Etruscan tombs, and consist of urns, vases, ornaments, etc., of especial interest.

**Alcove 121.**—Reproductions of objects of bronze from Pompeii, on pedestals, originals preserved in the Naples Museum. In a small case are a few illustrations of European stone-age art.

Collections of South Sea Islands. Ethnographic material loaned by Mr. Wm. Preston Harrison.

**Alcove 122.**—The wall cases contain an excellent series of images and other works of art in stone, bronze, wood, earthenware, etc., relating to the religious beliefs and observations of various oriental peoples. Buddhistic and Brahmanistic subjects predominate. Forming a part of the same series are an elaborately wrought brass incense burner from Benares, India, and the model of a Japanese Buddhistic altar, occupying spaces next the doorway.

## EAST COURT.

### ARCHEOLOGY OF AMERICA.

#### The Central Floor Space.

Cases holding important exhibits of figure groups in plaster, mound models, etc., surrounded by table cases containing various groups of archeological material. The installment of these exhibits cannot be considered permanent, as collections are being added from time to time.

Beginning at the west we have, in the middle line, a group of three Indians, executed in plaster, and elaborated with much detail. They are represented as engaged in the work of quarrying bowlders and roughing out stone implements from them. Associated with this group are five cases illustrating the ancient flint, copper, soapstone and red pipestone quarries of the United States.

This case contains a model of the serpent mound, Adams county, Ohio, which has recently been embodied in a park under the auspices of the Peabody Museum of Cambridge, Mass.

Twelve table cases on the south side contain interesting and valuable collections from Mexico. They illustrate the art in stone, clay, metal and bone of the ancient, half-civilized tribes of Yucatan, Chiapas, Oaxaca and the great plateau of Mexico.

Costa Rican antiquities, metates, pestles, stone implements and carvings. Nicaraguan antiquities, metates, pestles, stone implements and sculptures.

### ALCOVES OF THE EAST COURT.

**Alcove 81.**—Shell heaps. Maine.

**Alcove 82.**—Archeology of Illinois.

**Alcove 83.**—Archeology of Ohio.

**Alcove 84.**—The cases of this alcove are devoted mainly to archeologic collections from Wisconsin.

**Alcove 85.**—Archeologic collections from Arkansas and other southern states.

**Alcove 86.**—Antiquities from California, including mortars, mealing stones, perforated stones, axes, bone implements, pottery and shell ornaments.

**Alcoves 87 and 88.**—Pottery, basketry, matting, textile materials, woven articles, etc., of the Cliff Dwellers of Utah and the ancient Pueblos of New Mexico and Arizona.

**Alcove 89.**—Archeology of the Peruvian Highlands.

**Alcove 90.**—Archeology of the Santa Valley, Peru.

**Alcove 91.**—Archeology of Chancay, Peru.

**Alcove 92.**—Contents of graves, mummies, Ancon, Peru.

**Alcove 93.**—Archeology of Cauca and Magdalena Valleys, Colombia.

**Alcove 94.**—Pottery and stone implements, Chiriqui, Colombia.

Swung at various points beneath the galleries are boats representing many primitive peoples, and at the ends of the court are exhibited four totem poles, or heraldic columns, from British Columbia and Alaska.

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## SOUTH COURT.

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### AMERICAN ABORIGINAL SCULPTURE.

The east alcoves of the South Court contain mainly reproductions of Central American antiquities.

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## HALL 9.

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### EGYPTIAN ARCHEOLOGY.

In this hall are now installed the extensive collections brought together by Mr. Edward E. Ayer during his recent trips to Egypt. The nucleus of the collection is a set of twenty mummies representing a wide range of characters and covering a period of nearly two thousand years of mummy-making, closing with the development of Christianity. Notable exhibits may be briefly referred to. Translations of all important hieroglyphic inscriptions have been made by Dr. J. H. Breasted, of the University of Chicago.

**Case 1.**—Mummy of a lady named Meu, in coffin with light colored lid with yellow stripes, containing inscriptions; 22d dynasty, B. C. 1000.

**Case 2.**—Mummy of a man named Pu-Nefer. Faces on cartonnage and lid of box are well modeled and of noble expression. 19th dynasty, B. C. 1200.

**Cases 3 and 6.**—The two wide, low cases contain neatly prepared mummies in their original coffins, three of which are wood, and one, a unique specimen, of interlaced bulrushes.

**Cases 4 and 5.**—Two coffins occupy cases near the north end of the hall; one is a rectangular box with arched lid and corner posts, and is elaborately painted with symbolic designs and inscriptions; lady named Naja-Rames; 27th Dynasty, B. C. 700. The other is what is known as a mummy-shaped case, and is a fine example of the more ornate painted coffin; lady named Djemut-eseneh; 21st dynasty, B. C. 1100.

**Case 7.**—An excellent example of mummy of early period. The inner and outer cases are both exhibited; the inner case, containing the body, has never been opened; lady named Tent-At; 21st dynasty, B. C. 1100.

**Case 8.**—In the small floor case are mummies of two young children with elaborate gilt masks.

**Case 9.**—Alabaster vases.

**Case 10.**—Bronze implements, utensils and personal ornaments. Donated by Wm. G. Hibbard.

**Case 11.**—Bronze implements, utensils and ornaments. Amulets of stone and glazed earthenware.

**Case 12.**—Grave tablets of various periods. Personal ornaments of glass beads and glazed earthenware.

**Case 13.**—Grave tablets, pottery and mortuary offerings.

**Case 14.**—Bronze implements, utensils and ornaments.

**Cases 15 and 16.**—In wall cases at the east and west are two pairs of coffins placed in an upright position.

**Case 17.**—Against the west wall, near the south end, is a case containing five mummies of young persons. One of these is remarkable in having a portrait painted on wood substituted for the usual mask, and another has the wrapping removed, so that a good idea of the state of preservation may be gained.

In other floor cases and in the wall cases are many interesting relics of art, including utensils of bronze, iron, wood, earthen-

ware and stone, and numerous examples of jewelry of the simpler varieties.

Occupying the upper line on the wall are a number of good examples of balcony fronts from modern Cairo, and three specimens of mushrabia colored glass screens.

**Case 18.**—Ushehti figures of wood from ancient tombs.

**Case 19.**—Figures of various divinities in bronze. Donated by Mr. Watson F. Blair. Bronze mirrors, etc.

**Case 20.**—Mummies of cats, dogs, jackals, hawks, alligators, etc.

**Case 21.**—Tablets, earthen vessels.

**Case 22.**—Earthen vessels.

**Case 23.**—Alabaster vases and objects.

**Case 24.**—Papyrus, images and small vessels of stone.

**Case 25.**—Papyrus, vases of stone, terra cotta figures.

**Case 26.**—Alabaster (stalagmite) vases.

**Case 27.**—Earthen vessels.

**Case 28.**—Earthenware Ushehti figures with blue glaze.

**Case 29.**—Writing material, wooden combs, mats and baskets of fiber.

**Case 30.**—A set of excellent casts of ancient Egyptian sculptures, the originals of which are preserved in various trans-Atlantic museums.

**Case 31.**—Numerous mortuary objects, among which are to be especially noted the canopic box and three distinct types of mummy cases.

#### HALL 4.

#### OCEANICA.

This hall contains the Finsch collection, the Peace collection, and portions of the Hagenbeck collection.

**Case 1.**—Lances, bows and arrows, shields, war clubs, drums, masks and grass mats from New Guinea.

**Case 2.**—Lances, paddles, war clubs, masks and grass matting from New Britain.

**Case 3.**—Lances and fringed bark girdles from New Caledonia.

**Case 4.**—Models of houses, pottery, baskets, grass bags, grass cloth, fans, ornaments and engraved bamboo.

**Case 5.**—Wooden cylinder for printing on bark, bark cloth, and grass skirts from Samoa.

**Case 6.**—Grass cloth, grass skirts and mats from New Hebrides.

**Case 7.**—Carvings, lances, bows, arrows, clubs and paddles from various South Sea Islands.

**Case 8.**—Idols from New Caledonia and New Hebrides. Funeral manikin from New Hebrides.

**Case 9.**—Stone implements, fishing tackle, wood, gourd and clay vessels, bark and textile clothing and various personal ornaments from New Guinea.

**Case 10.**—Implements and weapons of wood, stone and shell; baskets, masks, figurines and various other ceremonial objects, musical instruments and personal ornaments, New Britain and New Ireland.

**Case 11.**—Clubs, large jade axes, New Caledonia.

**Case 12.**—Creeses—sword-like knives—with sheaths, a distinctively Malay weapon, Malay Archipelago.

**Case 13.**—Bark beating implements, clubs, grass cloth and mats, textile fibers, and various personal ornaments from Micronesia and Polynesia.

**Case 14.**—Lances, Admiralty Islands. Clubs and stone implements from New Zealand. Lances, shields and boomerangs from Australia.

In the middle of the hall are placed two wooden drums from Samoa.

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## HALL 5.

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## ASIA.

This hall contains the Pogosky collection from numerous barbarous tribes in Eastern Siberia, the Javanese theater set of masks, etc., exhibited at the World's Fair, and parts of numerous collections of lesser importance.

**Case 1.**—Fur, fabric and fish skin garments of the Tungus and Goldian men and women. In the northern end of the case sinew nets, mats and looms of the Saghalien Ainu; coats made from thistle fiber, elm bark and carp skins.

**Case 2.**—Corean armor, chest, boxes, basket, etc. Japanese embroidery, silk costume, weapons, armor, matting, wood carving, etc. Chinese masks, pillow, hat, chop-sticks, opium pipe and Chinese and Japanese swords.

**Case 3.**—Javanese theater set of masks, costumes, head-dresses and marionettes.

**Case 4.**—Javanese musical instruments and Ceylon drums.

**Case 5.**—Ceylon spice mortars, model carts and earthenware. East India metal work. Persian metal work. Arabian scales.

**Case 6.**—Siberian and Saghalien Island, summer and winter boots, stockings and trousers.

**Case 7.**—Singalese costumes, pottery and baskets.

**Case 8.**—Ceylon theatrical masks.

**Case 9.**—Ceylon vegetable fibers, cordage and winnowing baskets. Hats from Malay Archipelago.

**Case 10.**—Model of a Japanese pagoda.

**Case 11.**—Shields, spears, arrows, oars, a small gun or cannon; Malay Archipelago.

**Case 12.**—Ornamental bedspread and mats made of deer and squirrel skins; Tungus tribes of Eastern Siberia.

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## HALL 6.

### AFRICA.

This hall contains the Remenyi collection, part of the Hagenbeck collection, the collections of Messrs. Lingle and Davenport and the Elliot collection from Somaliland.

**Case 1.**—Camel trappings, mats, musical instruments, water bottles, etc., from Eastern Africa.

**Case 2.**—Dahomy cloth, mats, drums, fetishes and leather work. Grass cloth, hats and mats from Cameroon and Gaboon, and blacksmith's bellows and cross bows from Gaboon. Fine grass cloth mats, wooden dishes, images, stool and musical instruments from the Congo Basin.

**Case 3.**—Zulu shields, spears and clubs.

**Case 4.**—Bracelets, snuff-boxes, spoons, tobacco pipes, head rests, earthen and wooden vessels, and basket work of the Zulu.

**Case 5.**—Basketry, sandals, horse trappings, head rests, spoons, musical instruments and personal ornaments, Nubia.

**Case 6.**—Spears, arrows, quivers, knives, swords, war clubs, shields, basketry, personal ornaments, etc., Somaliland, East Africa.

**Case 7.**—Various utensils, implements, weapons, musical instruments and personal ornaments from the Congo Basin and West Coast.

**Case 8.**—Walking sticks, clubs, powder horns, arrows, axes and whips of the Zulu.

**Case 9.**—Zulu necklaces, armlets, anklets and belts.

**Case 10.**—Shields, spears, arrows, knives, hatchets, horns, etc., Congo Basin.

**Case 11.**—Shields, spears, cross bows, knives, blacksmiths' bellows, West Coast.

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## HALL 10.

### ESKIMO.

The Eskimo tribes are separated into two great groups, a western occupying the shores of Alaska and the British possessions, and the eastern occupying Labrador, Greenland and the adjacent regions; both are closely allied in blood, habits, customs and arts. They subsist largely by hunting and fishing, and evince much ingenuity in the pursuit of these callings.

**Case 1.**—Models of types of houses.

**Case 2.**—Textile fabrics, mats, baskets, etc.

**Case 3.**—Clothing of the Greenland Eskimo.

**Case 4.**—Clothing of the Hudson Bay Eskimo.

**Cases 5 and 6.**—Clothing of the Alaskan Eskimo.

**Case 7.**—Clothing of the Siberian Eskimo.

**Case 8.**—Eskimo man using bow drill, woman scraping a skin.

**Cases 9 and 10.**—Masks, pipes, implements, etc.

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## HALL 11.

### ESKIMO.

**Case 1.**—Group of Eskimo family, with dogs and sleds.

**Case 2.**—Eskimo hunter in Kyak with throwing stick and spear.

**Case 3.**—Eskimo girl fishing through hole in the ice.

**Case 4.**—Adzes, ice picks, etc.

**Case 5.**—Bows and quivers.

**Case 6.**—Sleds, harness, etc.

**Case 7.**—Bird and small game, harpoons, spears, darts, arrows, etc.

**Case 8.**—Whale, walrus and seal harpoons, ice scoops, blubber hooks, etc.

Over the cases of this hall are installed several examples of skin boats of the Eskimo tribes.

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## HALLS 12 AND 13.

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### NORTH PACIFIC COAST.

The collections in these two Halls comprise exhibits from the Tlingit, Haida, Tsimshian, Bellacoola, Kwakiutl, Salish and Chinook tribes. Owing to the complete rearrangements of the contents of both halls it is not possible to locate the exhibits.

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## HALL 14.

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### MEXICO, COSTA RICO, PERU, BRAZIL.

In this hall are installed the following collections: Sierra Madre Indians of Mexico, collected by Mr. Lumholtz; Modern Mexican ceramics; blankets, ponchos, and other objects of wearing apparel from the Jiveros, Zaperos and Chunchos Indians of Peru; Basketry from Brazil.

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## HALL 15.

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### VENEZUELA, BRITISH GUIANA, PARAGUAY.

One side of this hall contains the valuable collections from Venezuela and British Guiana, the first having been collected by Lieutenant Roger Welles, the other collection having been presented by Mr. J. J. Quelch.

The other side of the hall contains the collections of Dr. E. Hassler from the Gran Chaco tribes. The most northern of the group inhabit Brazil and Bolivia, while the more southern extend into the Argentine Republic. The principal tribes representing are the Tobas, Lenguas, Chamacocos, Guaranis, Cuximosso, Panas, Paitas and Omiris. The collection is especially interesting as representing tribes which have had but little contact with civilization. The collection contains much beautiful feather work, and a number of remarkable stone weapons.

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### HALLS 16 AND 17.

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These halls are devoted to the Hopi collections, nearly all of which were presented by Mr. Stanley McCormick. Owing to contemplated changes to be made in the halls it is not possible to give here the location of individual cases.

**Hall 17.**—Devoted to an exposition of the archeology of the Hopi, and to the domestic side of their modern life.

**Hall 18.**—Devoted to Hopi religion and ceremoniology.

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### HALL 18.

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Edward E. Ayer Hall.

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### TRIBES OF THE GREAT PLAINS.

Extensive changes are being carried on in this hall so that it is not possible to give the locations or groupings of the exhibits. The hall is devoted to the so-called tribes of the Great Plains, including the Athabascon, Algonkin, Sioux, etc. The hall contains only a small part of the gift of Mr. E. E. Ayer.

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### HALL O.

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### MUSICAL INSTRUMENTS.

The collection in this hall consists of musical instruments from Java and India, also a series of reproductions of antique instruments.

**Case 1.**—Contains several sarons of various sizes. The saron

is a musical instrument used to a great extent in a Javanese orchestra. It consists of a number of bronze bars of about two inches wide and six inches long, of graduated thickness, placed side by side across an elaborately carved and painted base and which are loosely held in position by means of metal pins. The saron is played upon by a small wooden mallet.

The bonang.—A set of seven kettle-shaped gongs of various tones, resting on rattan strips fastened to a carved and painted low stand and which is also a Javanese musical instrument. The player sits cross-legged upon the ground and plays the bonang by means of a padded stick.

The soeling, a bamboo whistle, which is the only wind instrument used in a Javanese orchestra.

There are also in this case, drums from Java and India.

**Case 2.**—Is devoted to Javanese musical instruments, these being four single gong bonangs; two very large deep sounding gongs suspended from a rack, which are played by a stick having at one end a large ball of rubber; and a rehab, a two-stringed violin played by the leader of a Javanese orchestra, with a bow of loose stretched horse-hair.

**Case 3.**—An eighteen bronze-barred saron of a very wide register. A seventeen wooden-barred saron. Two gendangs—a small drum, forming a part of a Javanese orchestra. The banya, dholaka, tabla, midranga or drums of East India.

**Case 4.**—An interesting collection of twenty wind and stringed musical instruments from India, consisting of the mahat vina, which is constructed of two gourds, connecting a horizontal rod of bamboo, upon which are stretched seven wires of various thickness, these being tuned by an ordinary key, similar to the guitar or banjo key, but somewhat larger; the mayuri which has eighteen fine wire strings; the kachapi vina is another stringed instrument; likewise the ektara, which has but one string. Other very peculiar instruments in this case are the chikara, the sanyogi and the surangi, each of which have two sets of strings, one of catgut strung over a bridge, and directly above a set of brass wires which run through holes in the bridge.

The wind instruments are chiefly the rana sringa, the puni and the benu.

**Case 5.**—Reproductions of antique forms of musical instruments, such as the Elizabethan lute; the rebec, and Arabian

stringed instrument; the crwth which is a Welch instrument said to be the oldest known stringed instrument; guitar (Antonius Stradivarius); the quinterna, an antique form of an Italian guitar, the xylophone, and a harp of Irish form. This collection was presented by Lyon & Healy.

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## HALLS 30 AND 31.

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### TEXTILES.

The collections in this Division have been arranged to show as far as possible the more important steps which have led to improvement in hand work or progress in the invention of those implements, machines and processes that have brought about the marvellous development of the Textile Industries.

#### HALL 30.

This hall has been set aside for the installation of such old looms as can be obtained and models of the more modern types, together with the appliances used by the uncivilized people.

The objects of greatest interest found in this hall are two old looms, one constructed and used on the Kentucky frontier during the last century for the weaving of homespun stuff, of which there is a well preserved specimen shown, and one of the first, if not the first, Jacquard loom used in America for the manufacture of what is now known as ingrain carpet. These looms are in excellent condition, there being nothing missing or any modern additions made to them.

There is also a model of a Japanese hand loom, such as is used to-day for the weaving of silk tapestries. Uncivilized races have furnished a few very interesting specimens of their handiwork in the construction of looms and the material thereon.

There is also to be found in this hall a well arranged collection of specimens of ancient textiles embracing many rich designs and colorings of brocades, velvets, damasks and embroideries of many combinations, and various specimens of flax, hemp and jute and the processes under which these products are treated before being placed upon the market in a manufactured state.

**Case 1.**—Loom constructed and used on Kentucky frontier for the weaving of homespun stuffs.

**Case 2.** Jacquard loom, one of the first used in America for the making of ingrain carpets, with an example of the work done upon it.

**Case 3.**—Model of a Japanese hand-loom, upon which is a small portion of a silken tapestry, similar to the Tsuzure Nishiki tapestry which hangs upon the south wall hall (3.)

**Case 4.**—Fibers; collection from United States Agricultural Department and articles manufactured therefrom.

**Case 5.**—Fibers; collections from United States Agricultural Department and articles manufactured therefrom.

**Case 6.**—Enlarged models of silk worms. Moths and cocoons showing development from the egg.

**Case 7.**—Pine fiber mattings, carpets and rugs.

**Case 8.**—Specimens of wool, illustrating various steps in the manufacture of blankets.

**No. 9.**—Device used by lacemakers, Island of Ceylon.

**No. 10.**—Flax brake.

**No. 11.**—Glass cylinder containing specimens of cotton and woolen waste.

**No. 12.**—Specimens of raw cotton, showing the successive steps in the manufacture of cotton threads.

**No. 13.**—Specimens of flax stalks, and flax in various forms, and specimens of manufactured linens.

**No. 14.**—The process of mohair from fleece to finished fabric.

**No. 15.**—Spinning wheel, foot power.

**Case 16.**—Various belongings of a loom and model of Navajo loom with example of weaving. Tappa cloth and instrument used in the making of it. Model of Navajo loom.

**No. 17.**—Spinning wheel, hand power; said to be over 116 years old.

**Case 18.**—Loom used by natives of Congo and specimens of the fiber used in the making of cloth; also, specimens of the cloth.

**Case 19.**—Peruvian loom, with partly worked example of the weaving, articles used in the preparation of woolen yarns, etc., taken from the grave of an ancient Peruvian. Hand-loom as

used by the natives of United States of Colombia, with example of weaving.

**Case 20.**—Hand-loom of Guatemala, with examples of work done thereon; also, a native hand-loom from Bolivia, with partly woven specimens, and implements used in connection with weaving.

**No. 21.**—Various specimens of Irish and Courtrai flax.

**No. 22.**—Specimens of manufactured linens.

**No. 23.**—Rope and matting made of the sheath of the shuro.

**Case 24.**—Working model of mechanical part of Jacquard loom.

**Upon the walls** of Alcove 107 and upon east and west walls of the hall and around the walls of the adjoining hall (Lecture Hall) are displayed excellent specimens of antique brocades, velvets, laces, embroideries, etc.

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### HALL 31.

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In this hall are shown the products of the loom and needle, and many interesting specimens, ancient and modern, of the loom will be found.

**Case 1**—Tsuzure Nishiki tapestry. This beautiful piece of tapestry, 22 feet long, 13 feet wide, represents the religious rites performed at the consecration of the Nikko Temple, and is of silk woven on a hand-loom, a model of which may be seen in Case No. 8. The artist, besides successfully portraying the magnificence of that famous temple, has succeeded in delineating, in a most successful manner, human figures clad in many different and peculiar costumes. The procession consists of over 1,500 persons. The principal objects are three sacred cars or portable shrines decorated with metallic mirrors, birds, sacred portals, tapestries, etc. Each of them used to be carried by 100 men, and two of them are here represented. Of the groups of men forming this procession, the most noteworthy are a body of guards in full armour, immediately following the first group consisting of the body of the heralds and the two Daimyo (princes) especially charged with the superintendence of the celebration of the occasion.

The building forming the central figure is the famous Yomei-

mon, which is a gate standing before the main building containing the statue of Prince Ieyasu. The gate is 37 feet high and the roof is 25 x 15 feet. Under each of the four corners of the roof is hung a bell of solid gold. The gable is decorated with carvings of rare animals. The inscription on the tablet on the front of the gate was written by the 106th Emperor, Goyosei, and the characters are of pure gold. The upper part of the pillars supporting the second story have carvings of dragons, gold and white, while the lower parts are decorated with lions. The pillars are twelve in number, of which the one here represented as standing in the center of the rear, is called the Inverted Pillar; the carvings of wavelets upon it are upside down. The explanation given is, "That perfection being sure to be accompanied with waning, that pillar has been intentionally inverted so as to prevent any further diminution of the grandeur and perfection of that building." On the railings are carved human figures, birds, animals, treasures and musical instruments. Brilliant figures of birds and flowers decorate the walls of the partitions on either side of the gate, as well as the roofed fence on both sides, which is over 300 feet long when extended in one line. The amount of labor spent on its manufacture can be judged when it is stated that a single face is the work of from three to ten days. Over four years, it is said, was spent in the production of this beautiful tapestry.

**Case 2.**—Korean beds made in Palace at Seoul.

**Case 3.**—Ceremonial vestment.

**No. 4.**—Japanese embroidered picture, "The White Phoenix on Paulownia Imperialialis." A striking specimen of Japanese embroidery.

**No. 5.**—Double damask table-cloth. A duplicate of one of a set manufactured for Her Majesty, Queen Victoria.

**Case 7.**—Collections of Italian tassels of the sixteenth to eighteenth centuries.

**Case 8.**—Upholstering goods, plush goods, dress goods and carpet covering, manufactured from Ramie fiber. White goods, laces, table damasks, etc., made from Ramie fiber.

**Case 9.**—Jamaica and Fayal fibers, ferns and articles manufactured therefrom. Laces and needle-work from Fayal. Needle-work from Ireland. Nanduty lace handkerchief from Paraguay, etc.

**Case 10.**—Old Japanese silk embroidered table cover.

Antique brocaded vestment. Specimens of antique Italian brocades.

**Case 11.**—Korean silken garments.

**Case 12.**—Straw hats woven by natives of South and Central American countries, Mexico and elsewhere.

**Case 13.**—Examples of Turkish textiles.

**No. 14.**—A chair-seat of woolen and silk tapestry, exact counterpart of the Gobelin weaving. The second piece done in America and woven by M. Foussadier for Wm. Baumgarten & Co., New York. Made January, 1894. The loom used in the production of this tapestry was made in New York, the harness being made of American twine; the woolen yarns and silk are native also, while the bobbins and combs are of home manufacture.

**No. 15.**—A Persian prayer rug; size, 14 feet 10 inches long by 10 feet wide, composed of twelve individual prayer rugs joined deftly and with considerable effect. This rug is of unknown age, but the donor states it is several hundred years old. The coloring of portions of this rug is very attractive, and it is claimed by experts that the art of preparing some of the dyes used has been lost. Two of its colorings, a most beautiful velvet green and a blue, resembling shades of malachite, are remarkably rich.

**No. 16.**—Japanese silk-embroidered picture, "Fujiyama."

**No. 17.**—Japanese silk-embroidered picture, "Plum Blossoms."

**Case. 18.**—Foreign and domestic manufactured silks.

**No. 19.**—Chinese silk-embroidered screen in hand-carved teak wood frame.

**No. 20.**—Cut velvet picture of Fujiyama. ("Sacred Mountain").

**No. 21.**—Japanese embroidered picture of chrysanthemums.

**No. 22.**—Japanese embroidered picture of bird and grasses.

**No. 23 D, 23 a, 23 b.**—80 well selected specimens of Indian fabric. A collection of baskets illustrating the ingenuity of the Indians of Central and South America in the weaving of straw; fibres and rushes are also to be found upon the walls.

**No. 24.**—Mummy and mortuary cloths.

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#### ALCOVE 107.

An old original foot-power fabric glove-machine used in Chemnitz, Germany, in 1834.

An old original foot-power hosiery machine used in Chemnitz, Germany.

Upon the walls are examples of old embroideries and textiles.

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## HALL 33.

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### CERAMICS.

The introduction of the most primitive of ceramic arts in any part of the globe is regarded as a first step in the beginning of civilization, and many objects made by the ancient peoples are to be found in the halls devoted to archeology. While the fabrication of Chinese and Japanese porcelain has been carried on for centuries, the manufacture in Europe began only about two hundred years ago. There the masters of the art for years enjoyed the patronage of the kings and princes.

Upwards of seventy-five years ago the first hand porcelains made in America came from the Tucker works near Philadelphia, but the industry languished after 1838. Several pieces of fine "Tucker" ware are in the collection.

The development of the art in America in late years is most encouraging.

**Case 1.**—Porcelain plate. Arita ware; diameter 24 inches; depth at center  $2\frac{5}{8}$  inches; decorated in imitation of the work of Kakiyemon, the distinguished Hizen potter.

Porcelain statue of Bellham, the greatest lyrical poet of Sweden.

Porcelain statue of Gustavus III.

Porcelain plate, hand-painted by Thorne, Stockholm, Sweden.

Porcelain plate, blue and gold border, Stockholm, Sweden.

Porcelain plate, chrysanthemums and fighting cocks; imitation of Japanese.

A decorated earthen jar, Jamaica.

**Case 2.**—Porcelain vase, decorated in birds of bright plumage; made by pupils of School of Technology, Tokio, Japan, for exhibition at Chicago. Cloisonne picture, without wire, of Fujiyama.

An exceedingly fine old Satsuma tray, representing a festival scene.

Five platters of Japanese (Seto) ware.

A cloisonné incense burner.

Cloisonné flowers in black lacquer.

A cloisonné bon-bon box.

Porcelain picture of Japanese (Seto) ware, representing a bridge of five curved sections or abutments, and pagoda-like buildings in background.

**Case 3.**—Thirteen Rhoda plates and four Damascus plates.

**Case 4.**—Fine examples of Pennsylvania German Sgraffiato ware made early in the century. The earliest known piece in this collection bears the date of its manufacture, 1793. There are many excellent specimens of this very interesting ware.

**Case 5** —An antique delft beer mug, polychrome decoration, with pewter cover dated 1777. Wine bowl of antique delft.

Antique delft apothecary jar with blue decoration.

Specimens of old Staffordshire, old Chinese ware, antique Italian majolica, Lowestoft.

Four porcelain cameos, white relief on blue ground (Wedgwood), made prior to 1795.

Two pitchers of old Liverpool (black and white) ware.

**Case 6.**—A collection of old Staffordshire platters, plates, cups and saucers with American views.

**Case 7.**—A collection of old Staffordshire ware, among which may be seen an exceptionally rare and unique design known as the "States" piece.

**Case 8.**—Examples of old Staffordshire with proverbs and sayings of Benjamin Franklin's. Also with American historic subjects, etc.

A set of Wedgwood plates bearing pictures of the various buildings of the Chicago exposition.

Terra-cotta plaques of buildings of the Chicago Exposition, made in Australia. Plates of Exposition buildings, made in Germany.

**Case 9.**—Examples of the Tucker hard porcelain, made between 1825 and 1838. American majolica, made in Phoenixville, Pa.

Toby jug, white ware, made at Trenton, N. J., 1887, and various specimens of American ware made by potteries long since closed.

**Case 10.**—Specimens of early American wares.

Four transparencies made at Phoenixville, Pa., between 1867 and 1870. Exceedingly rare and unique.

White undecorated ware, pitcher of Doulton stoneware, Rockingham jars, and representative types of Early American potteries.

**Case 11.**—Contains ten examples of the beautiful Rookwood ware of recent make, and two of an earlier make.

**Case 12.**—Various clays used in the manufacture of pottery, moulds, stilts, saggers, finished and unfinished and trial pieces from the Ohio Valley Pottery, Wheeling, W. Virginia, now suspended.

**Case 13.**—Glass-ware manufactured by the Venice and Murano Manufacturing Co., at their exhibit, Midway Plaisance, Chicago Day, October 9, 1893; replicas of famous pieces.

**Case 14.**—Tea set of porcelain covered with gold by "Chryso-Seramic" process executed by Miss Healy, Washington, D. C.

Vase, exact copy of the Royal Meissen, (a German vase), with landscape in Jemtland, by Thorne.

Porcelain vase, Greek design, ornamented with gold, a copy of Macribey, similar to the Limoges ware.

Porcelain from the Worcester Royal Porcelain Company.

Porcelain compotier and candelabra made by the St. Mary's Porcelain Works, Langton, Staffordshire, England.

**Case 15.**—Glass-ware manufactured in Ehrenfeld, Prussia.

**Case 18.**—A large porcelain center-piece of Limoges ware for dining-table; remarkable for success achieved in delicate coloring at high temperature. It is one of the most important pieces of hard porcelain ever made, and in the making of it difficulties have been overcome that only a manufacturer can appreciate.

**Nos. 19 and 20.**—Two large and handsome Kutani (Japan) vases of purple and blue, hydrangea design.

This ware is much prized in Japan on account of its fine enamel colors and elaborate ornamentation.

**No. 21.**—Vase of Ault faience.

**No. 22.**—Jardiniere and pedestal of Ault faience.

**No. 23.**—Large vase of modern (trade) satsuma.

**No. 24.**—Jardiniere and pedestal of Ault faience.

**No. 25.**—Large vase of Ault faience.

**No. 26.**—Jardiniere and pedestal of Ault faience.

### ALCOVE 104.

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Two large handsome royal blue Berlin porcelain vases, decorated with medallions, cupids and festoons of golden vines and raised flowers. They stand nine feet and two inches high, and are among the largest porcelain vases ever made. They are a gift from Richard Hortsman, of Berlin, and are of great value.

Three ancient earthen wine jars from Rome, which attracted great attention during the Exposition, where they were located near the Horticultural Building. These jars, which have a capacity of about 400 gallons, were in use many years ago in the preparation of wine, and were collected in Italy by an expert sent abroad by the World's Columbian Exposition. No. 1 was found at Lubiaco in the grounds of the late Duc di Sarmonta. Nos. 2 and 3 were found at the Villa Ludovici while excavating for the foundation for the Boncompagni Palace. No. 6 is a large glazed jar of symmetrical form from Japan.

Tea jar of Shigaraki ware, used in certain parts of Japan as a storage for tea and as a preventive from dampness to the same.

Vases and urns of terra-cotta.

Plaster casts of figures representing "Temptation" and "Victory," made and presented by Fujita Bunzo of Tokyo, Japan.

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### PHYSICAL ANTHROPOLOGY.

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This section is situated on the east and south galleries of the East Court. On the east gallery is the Anthropometric Laboratory, in which are placed the various physical apparatus.

There are in the same room, apparatus for illustrating the law governing the distribution of individuals in a binominal curve, and for the drawing of the outlines of the various parts of the skeleton.

In addition there are apparatus for taking the measurements of the body. Among the instruments here used are an adjustable table for measuring the stature, and a chair constructed on a similar principle to study the variations in the length of the trunk, at different angles of incline to the perpendicular.

A notice hung in the middle panel, on the outside of the laboratory wall, will indicate the hours during which the laboratory will be open.

On the south gallery are situated cases containing the collections of crania, skeletons, etc.

**Case 1.**—Cranimetrical nomenclature.

**Case 2.**—Sexual variation in the skeleton.

**Case 3.**—Skulls showing the range of variation in the sutures.

**Case 4.**—Skulls showing the range of variation at the glabella and pterion, and in the orbits.

**Case 5.**—Skulls showing variation in the nasal skeleton and in the degrees of prognathism.

**Case 6.**—Skulls showing variations in the intermaxillary suture, mastoid process, shape of palate and direction of palatine suture, and at the region of union.

**Case 7.**—Skulls showing variations in the lower jaw, lachrymal bone and occipital condyles.

**Case 8.**—Clavicles and scapulae selected to show range of variation.

**Case 9.**—Skulls showing the range of variation in dentition.

**Case 10.**—Sacri, sterni and ossa innominata selected to show range of variation.

**Case 11.**—Humeri and tibiae selected to show the range of variation.

**Case 12.**—Skulls showing range of variation in capacity, the cephalic and altitudinal index.

**Case 13.**—Skulls showing the range of variation in the orbital, nasal and dental indices.

**Case 14.**—Skulls showing the range of variation in the facial, palatal and bizygostephanic indices.

**Case 15.**—The range of variation in the scapular, lumbar, sacral and pelvic indices.

**Case 16.**—The range of variation in the femur.

**Case 17.**—Skulls affected by disease.

**Case 18.**—Skulls artificially deformed.

**Case 19.**—Trepanned skulls from Peru.

**Cases 20, 21, 22, 23, 24 and 25.**—Disarticulated skeletons showing a wide range of pathological or anomalous characters.

**Case 26.**—The Cunningham series of models illustrating the surface of the brain and its correlation with the skull.

**Case 27.**—Casts of cranial cavities of various animals and races of men.

**Cases 28 and 29.**—Articulated skeletons of a gorilla, and of individuals of various races.

**Cases 30 and 31.**—The chemical constituents of the human body.

**No. 33.**—(Wall). Life masks of the people of the east coast of Asia and of Oceanica.

## HALL 32.

H. N. Higginbotham Hall.

### GEMS AND JEWELS.

The collection of gems and precious stones that, during the World's Columbian Exposition, attracted so much attention at the Tiffany pavilion in the Manufactures Building, and in the gallery of the Mines and Mining Building, has been added to and occupies the central cases in this hall. It is believed to be the most complete collection in existence, for it contains nearly every known gem or precious stone, in the finest cut examples, in fine crystals, cleavages or rolled grains, always of gem value. Many of the objects in the collection are of historical interest and of world-wide reputation.

**Case 1.**—Handsome objects made of rhodonite, jasper, and varieties of rare gem stones found in the Ural Mountains, Asiatic Russia. Prominent objects are a rhodonite jewel casket, rhodonite ink stand, two rhodonite coupés of rare markings, with jasper bases. Rhodonite is a favorite stone with the imperial family of Russia.

Three fruit pieces of realistic effect made at Ekaterinburg, Asiatic Russia, composed of the following hard and rare gem stones found in the Ural Mountains: Raspberries of rhodonite, blackberries of amethyst, white currants of chalcedony, plums of onyx and sard, mulberries of citrine, black currants of onyx and red currants of sard. The bases are of Kalkansky jasper and the leaves of precious serpentine.

A composite bust of Empress Eugenie; feathers, opals and

red jasper; hat, sard; hair, sard; face, chalcedony; collar, blood-stone; beads, yellow jasper; dress panel, lapis-lazuli; body, sard.

Cane of solid silver, inlaid with discs of turquoise from Kurdistan, southwest Asia.

Florentine mosaic of marble, malachite, etc., representing Fall of Rome.

**Case 2.**—Engraved diamond bust of King William II. of Holland, executed by DeVrees, of Amsterdam, which required all of his spare time for five years. Was shown in 1878, at the Paris Exposition.

A diamond crystal adhering to common boart, from Kimberly, South Africa.

A model of the Dewey diamond, weight  $23\frac{1}{2}$  carats, found in 1855, near Manchester, Va.

Diamond (round boart), weight 41 9-32 carats. This variety is extremely hard, shows a radiated structure if broken, and is peculiar to Brazil.

Cut and uncut specimens of black diamond from Bahia, Brazil, South America.

A collection of over fifty diamonds in their natural state, and a crystal in matrix from South Africa.

Gem gravel containing ruby, sapphire, zircon, tourmaline, quartz, etc., from a Ceylon river bed.

A collection of fifteen rubies from Ural Mountains, North Carolina and Georgia.

Cut and uncut specimens of various colored sapphires, found on the banks of the Missouri river sixteen miles from Helena, Mont.

Uncut specimens of sapphires from Ceylon, Siam, India, and Asiatic Russia.

Richly colored chrysoberyls and alexandrite; from Ceylon and the Ural mountains.

Six star sapphires, from Ceylon, the largest of which weighs 134 karats.

A ninety-nine and a sixty-six karat yellow sapphire (oriental topaz), a fifty-nine karat blue sapphire, also yellow, pink, white, and other colored sapphires. Spinels, fine red, blue and other colors.

The Chilton doubly-terminated emerald crystal in a matrix of black limestone, from U. S. Colombia.

Emerald crystal six inches in length and about a half inch in diameter, remarkable for its length, from Alexander county, N. C.

**Case 3.**—Blue topaz, smoky quartz of fine cutting and exquisite luster, albite, golden beryls, and orthoclase, from the Ural Mountains, also colored topazes of Asiatic Russia, Brazil, Ceylon and Colorado.

The 331½ karat Hope aquamarine and other fine examples of sea-green, sea-blue, yellow and other colors of beryl.

Beautiful beryls from Maine, Russia and Brazil, also strings of turquoise beads made by the Indians of Santo Domingo, N. M.

**Case 4.**—An exceedingly fine collection of quartz and quartz cuttings, notably:—

A large jewel casket composed of twenty-six engraved crystal slabs, mounted in jeweled and enameled silver; style, seventeenth century; original in Ambras Collection, Vienna.

Screen, "The Finding of Moses," engraved on a thin section of rock crystal 9 3-5 inches in diameter, believed to be the largest section of its kind in existence.

Tazza of quartz, engraved to represent a marine festival.

Large crystal sphere, from the summit of Mt. Antero, Colorado, one of the largest crystal balls ever polished.

A group of crystal balls mounted on a stand of metallic leaves, the whole representing fruit and foliage.

A quartz crystal, scratched so as to show the method of slicing quartz in the manufacture of spectacle lenses.

A series of fourteen specimens of crystal intended to show the various steps in the cutting of a brilliant.

Fine examples of cut crystal from Asiatic Russia; seal having a Turkish inscription on one end and a Russian on the opposite; a frame of the seventeenth century; chandelier pendant, eighteenth century, French cutting; a head of a horse and a bust of Ivan Tourgenieff.

A cut crystal, from Mexico, the finest specimen of aboriginal work of this kind ever found in that country.

**Case 5.**—Zircons of various colors. A dark golden smoke color, round brilliant, weight 41½ karats, Kandy, Ceylon. Also one weighing 46½ karats from same place.

Tourmalines of many colors, from Brazil and Maine.

Fine specimens of phenacite from Ural Mountains and Colorado.

Rubellites from Brazil, weighing 21 karats.

Green garnets, Ural cutting, cushion shaped.

Precious garnets: Navajo Nation, New Mexico; Bohemia; and Kimberly, South Africa.

Rare specimens of peridot from Levant.

Rare specimens of almandite.

Essonites from Maine and Ceylon.

Spodumene, yellow, Minas-Geraes, Brazil.

Carbuncles, Siriam, Pegu, India.

Spessartites from Virginia.

**Case 6.**—Rock crystals from Madagascar, Brazil, and Ural Mountains. A beautiful collection of the doubly-terminated quartz crystals, loose and in the matrix, from Herkimer county, New York, commonly known as Little Falls diamonds.

Cats-eyes, quartz, and polished, from Bavaria, North Carolina and Ceylon.

Thirteen cut and two uncut specimens of rose quartz from near Albany, Oxford county, Maine.

Three polished specimens of plasma from Openau, Baden, Germany.

**Case 7.**—Agate section. Natural color, transparent, from Uruguay, South America.

Wood opal from Colorado.

Opal in matrix, from Queensland, Australia.

Flexible sandstone from North Carolina.

Geode from Uruguay.

Polished specimens of banded jasper from Russia.

Agates of Uruguay, South America, grotesquely cut to resemble owls and human faces.

**Case 8.**—Cut amethysts from Brazil, France, Ireland, Ceylon, Hungary and Russia; believed to be the finest collection in existence.

Uncut amethysts from Mexico, North Carolina and Russia.

Spanish topazes, a fine series. In the "Spanish topaz" the original coloring of the carbon in the smoky quartz has been changed by the action of heat to the rich hues so much admired.

Cut and uncut smoky quartz from North Carolina, Colorado, Ural Mountains and Switzerland.

**Case 9.**—Opals in the natural state, also engraved and polished, from Russia, Queensland, Mexico and state of Washington, including the famous Sun God opal from the Hope collection, which is said to have been known in a Persian temple for three centuries.

Fine specimens of tiger-eye of rare luster, jasper, mocha stones, moss agates, sardonyx, chrysoprase, agates, and chalcedony.

The finest specimen of hydrolite known (the bubble of symmetrical shape being two and one-half inches in diameter) together with many beautiful and rare specimens of agate and chalcedony, cut and uncut, from many parts of the world.

**Case 10.**—Specimen of crystalized apophyllite from Mexico, a magnificent piece of labradorite and a very beautiful specimen of iron pyrites.

Two sections of a boulder of jade from the western coast of Australia; jadeite from Burmah, India.

Fluorite from Derbyshire and Cumberland, England, one group being encrusted with calcite crystals. Two specimens of antique carving of lion's feet in marble, from Rome, Italy.

Porphyry from Finland and Egypt.

Phulite from Norway. Landscape marble from England.

**Case 11.**—Fine collection of crystalized Amazon stone from Pike's peak, containing several unique specimens of twin crystals; superb moonstones from Ceylon; sunstones from Norway.

Interesting cut specimens of iolite, wollastonite, titanite, kyanite and prehnite.

Gems cut from the so-called "minerals of the rarer earths," samarskite, gadolinite, allanite and euxenite, also magnificent groups of diopase, the rarest ore of copper; an interesting series of malachite and azurite from Arizona; a series of cut fluorites.

Ancient Mexican mirror of iron pyrite.

Antique Persian figures of lapis-lazuli; lapis-lazuli from Bolivia, South America.

**Case 12.**—Obsidian fragments and obsidian arrow points and ornaments.

A collection of jade ornaments from China, Mexico and New Zealand.

A collection of pearls from Japan, Australia, Algiers, Singapore and California; pearl oyster shells, fresh water mussels, etc.

Collections of amber, precious coral, pink coral ornaments, mummy eye, etc.

Amber with vegetable enclosure. A circular amber bead from Mexico, believed to be the first noted appearance of amber as an ornament in ancient Mexico. It was used as an incense in their temples.

**Cases 13, 14, 15, 16, 17 and 18.**—These wall cases contain the Tiffany collection of Indian jewelry, and form the most complete series ever exhibited in any museum. Many of the pieces are very old, of rare forms, consisting of rings, armlets, bosom ornaments, surah holders, ornaments for the forehead, hair, ear, waist, ankles, upper arm, etc., together illustrating the remarkable variety of the ornaments and of the jeweler's handicraft practiced in India for more than 2,000 years. The collection is divided into three sections.

First: Objects made from pure unalloyed gold, as worn by the higher caste only, containing diamonds, rubies, emeralds, sapphires, pearls, garnets, rock crystals, etc., and embellished with rich red and green enamels peculiar to the Indian work.

Second: Collection of silver jewelry, consisting of many large and beautifully wrought pieces, worn by a lower caste.

Third: Base metal jewelry, worn by the lowest caste only.

**Case 13.**—Contains forty-seven pieces of Delhi jewelry, which consists principally of necklaces and head ornaments of gold set with diamonds, pearls, rubies, emeralds, garnets, turquoises and crystals, and is characterized by the great number of pearls used and the frequency of small emerald pendants as decorations.

A gold necklace with yellow and green sapphire pendants. A pair of ear-rings of red and green enamel and pearls from Goa.

Two heavily wrought gold and silk necklaces from Muttra.

**Case 14.**—Contains upwards of fifty examples of jewelry from Bombay, which is remarkable for the few gems used and the great delicacy and artistic feeling shown in the gold work; also, fourteen pieces of Rajputana jewelry which resembles the jewelry of Delhi, but is heavier and less delicate.

Thirteen pieces of jewelry, consisting of surah holders, necklaces, armlets and nose rings from Baddhi. The jewelry from Baddhi is distinguished by the number of small gems used, one surah holder containing 492 rubies and eighty-two diamonds.

Four gold head ornaments from Bijapore.

One string of gold beads from Gwalior.

**Case 15.**—Considerable space is occupied by talisman neck-

laces and other pieces of jewelry from Jeypore, which show an abundance of enameling. There are also fifteen beautiful specimens of jewelry from Kathiawar, principally necklaces, which resemble those of Delhi, though containing less enamel.

There are also several necklaces from Brahma, and eleven gold belts and necklaces from Amritsar.

**Case 16.**—Devoted entirely to a collection of forty-seven pieces of gold jewelry from Gujarat which is characterized by the larger quantity of gold and small number of jewels used.

**Case 17.**—A collection of silver jewelry which contains many beautiful designs and fine examples of the ingenuity displayed by the oriental silversmiths in joining together the simple parts which united make a symmetrical whole.

The silver-work is from the cities of Gujarat, Rajputana, Amritsar, the Deccan District, Lahore and Bombay.

**Case 18.**—Examples of silver jewelry, and jewelry of base metal worn by the lowest caste. The latter while quite heavy is artistically designed, the ornamentation differing in great degree from that employed in silver and gold work.

The jewelry of base metal is mostly from the state of Gwalior.

**Case 19.**—Collection of cameos and intaglios engraved upon sardonyx, rock crystal, jasper, topaz, chalcedony, etc.

Collection of antique jewelry from Bulgaria.

Collection of Egyptian, Etruscan, Roman and Greek jewelry.

**Case 20.**—Collection of Egyptian jewelry.

Collection of Etruscan jewelry. Pompeian necklace.

Collection of gold nuggets from Washington placer mines, and collection of crystalized gold from Colorado. Natural gold nugget from Yukon-Klondike.

**Case 21.**—Carved bronze eagle on red lacquered stand. Iron Damascene plate.

Solid silver communion plate, pierced by German bullets in the Franco-Prussian war at Saarbrück. This was the first volley fired in the war. A new plate of the style perforated by German bullets in Franco-Prussian war.

Pair of carved wood figures, silver mounted, made in 1673, from Lord Charlemont's collection.

A carved ivory ornament taken from Shakespeare's home.

An engraved mother of pearl and silver box from Kenilworth Castle.

An antique snuff box of brass and copper from Holland.

**Case 22.**—Crown worn by the Duke of Sussèx at the coronation of Her Majesty, Queen Victoria.

Two large and handsomely designed maces of solid silver which were carried in advance of a Maharajah by his attendants on all state occasions. The most prized possessions of a Maharajah are his maces. He may lose his jewels, his money, his lands and his friends, but very seldom is he willing to part with the emblems of his authority, consequently very few maces have ever been brought out of India.

Two large and handsome tortoise shell combs, the larger one measuring fourteen inches in breadth and twelve inches high.

Card case, enameled work, sterling silver, hand painted, representing a bride in the national costume of Norway.

Walnut of silver containing a landscape made of natural pieces of Colorado native silver, gold, etc. Made in Denver.

Watch with Turkish numerals made in France latter part of eighteenth century for Turkish dignitary. Enamel work on back. It is yet in good running order.

Silver gilt wine cup in the form of a ship, which were much used in England in the sixteenth century.

**Cases 23 and 24.**—Remarkable collection of aboriginal American jewelry, found in various parts of Colombia and Ecuador, South America. The collection consists for the most part of objects used for personal adornment. It exhibits surprising workmanship in metals and knowledge of alloying.

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## ALCOVE 105.

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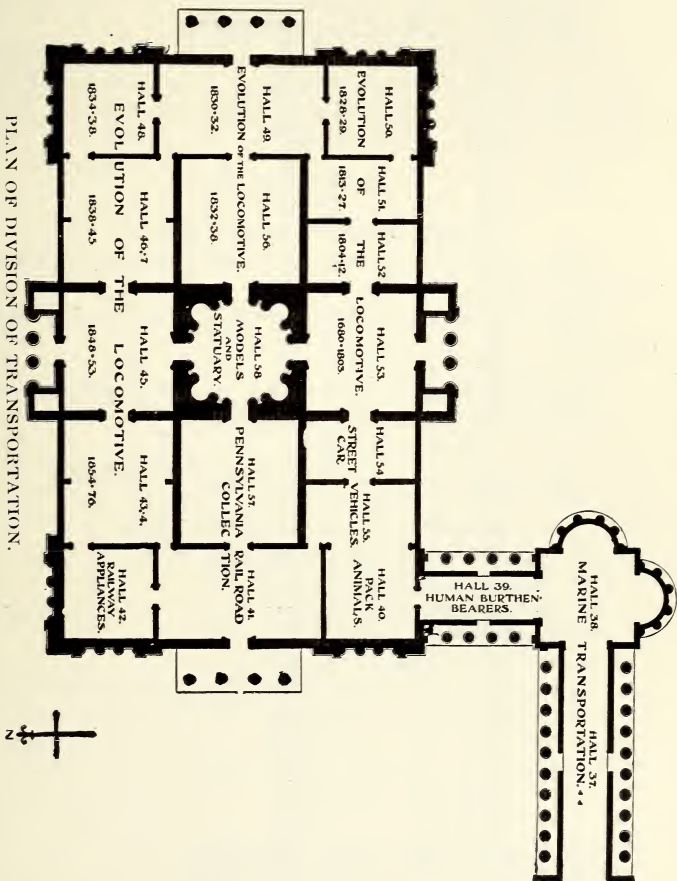
**Case 25.**—Coins of gold, electrum, silver, bullion, potin, aluminum, nickel, bronze, copper, brass, iron, tin, lead, glass, porcelain and paper, illustrating the metallurgy of coinage.

Ancient coins—Roman, Greek and Italian.

**Alcove Walls.**—Shield of steel and gold (5 feet by 8 feet) upon which are illustrated scenes in the Norse legend of Frithiof and Ingeborg.

Bronze group—Lafayette and Washington, by Bartholdi, the eminent French sculptor.

PLAN OF DIVISION OF TRANSPORTATION.



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ALCOVE 101.

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**FISHERIES APPLIANCES.**

On the wall may be found nets, seines and floats from Norway. A primitive anchor from Norway. A seine over one-quarter of a mile long, made in Russia; buoys, fish traps, etc., from other countries.

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ALCOVE 106.

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**AGRICULTURAL MACHINERY.**

The material in this collection was contributed by Mr. Cyrus H. McCormick.

Models illustrating the development of mowing and reaping machines.

Arabian plows.

Chinese plows, harrows and other agricultural implements.

Sections of a South American windmill.

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**HALLS 37, 38, 39, 40, 55 AND 54, EAST PAVILION.**


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**DIVISION OF TRANSPORTATION.**

A. Marine Transportation: Halls 37 and 38.

B. Human Burthen-Bearers: Hall 39.

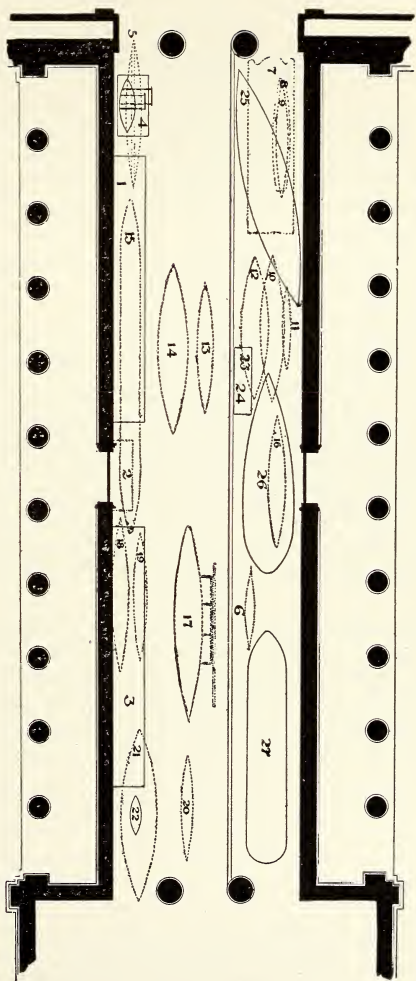
C. Pack Animals: Hall 40.

D. Land Vehicles: Hall 55.

E. Street (or Tram) Cars: Hall 54.

In the Division of Transportation all methods of marine and land conveyance are included, except the steam railway, which may be regarded as the culmination of the several series installed in the six Halls above enumerated. The exhibits are arranged in the order of development, beginning with the floating log and the human burthen-bearers and pack animals, continuing through methods of utilizing man and animals for traction, sledges and vehicles with wheels, and concluding with the street (or tram) car, which, when hauled by animals, marked the beginning of the present railway system.

The objects in this section, with very few exceptions, were acquired from the Department of Transportation Exhibits, World's Columbian Exposition.



PLAN OF HALL 37.

## HALLS 37 AND 38.

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MARINE TRANSPORTATION.

In these halls are installed an interesting series of original boats and models illustrating various methods of marine conveyance, floating with the tide, towing by man and beast, propulsion by pole, oar and sail, including models of the steamboat, steamers, towing rafts of logs and coal barges; also many relics of old-time whaling vessels.

In the center of Hall 38 stands an experimental Flying Machine, built by Lawrence Hargraves, of Stanwell Park, Clifton (near Sydney), New South Wales.

**No. 1.**—Models illustrating the progress of improvement in primitive craft, beginning with the chatti, or fisherman floating upon an earthen jar, and including various boats propelled by poles or oars. Other important objects are the Cingalese catamarans and outrigger canoes; the poorinda, a barge of state from Kashmir, India; an imperial caique, the state barge of the Sultan of Turkey; the Mohr punkee, or peacock boat, of the Ganges, used by the Rajahs and wealthier Hindoos as a pleasure boat; a barge from Burmah; state barge of the Governor of Kashmir, India; and finally the state barge of the Boa or Emperor of Burmah.

**No. 2.**—Padda (model) Colombo, Ceylon.

**No. 3.**—Models of oriental boats propelled by sails, beginning with the log raft, equipped with primitive sail; followed by the heavily laden Hindoo trading vessels moving by wind, and concluding with the great freight junk of the China coast—the highest development of the Asiatic sailing vessel. Interesting objects in this case are East Indian cargo boats with loads, illustrating the Hindoo methods of combined sailing, rowing and towing against the current; the loungo and louzgat, Burmese freight boats for transporting produce; the likin, or Chinese revenue cutter, and an extensive series of junks that ply along the China Coast.

**No. 4.**—(Upper boat.) Yattrava or Dhoney of Colombo, Ceylon. A decked vessel with outrigger and lug sails; usually manned by a crew of six men. Model about one-thirtieth full size.

(Lower boat.) Orua from Ceylon. Fishing boat with outrigger and lug sail. Model one-eighth of full size.

**No. 5.**—Catamaran, or raft (original), from Colombo, Ceylon. This was formerly used for transporting the royal mails from Colombo, coastwise, about the island.

**No. 6.**—Balsa (original), boat made of rushes, Lake Titicaca, Peru; for one person only.

**No. 7.**—Bimba (original), a catamaran, or raft with sides. St. Paul de Loanda, Angola, Africa.

**No. 8.**—Balsa (original), boat made of rushes, Lake Titicaca, Peru. Owing to its light draught large cargoes are often carried.

**No. 9.**—Cabilletto (original), fishing boat, made of rushes Huanchaca, Peru. Used in fishing, especially in heavy surf. The occupant kneels just abaft amidships of this boat and propels it by means of a short broad-bladed paddle.

**No. 10.**—Donga (original), from Benguela, Africa. A very primitive dugout. The addition of the strip along the gunwale is one of the earliest efforts to increase height of sides of the boat.

**No. 11.**—Dugout (original), for carrying two persons, Colon, Colombia, South America.

**No. 12.**—Dugout (original), from the headwaters of Rio Ozama, San Domingo. Made by Indians, but showing European influences both in exterior and interior form.

**No. 13.**—Dugout (original), from Seneca Indian Reservation, New York.

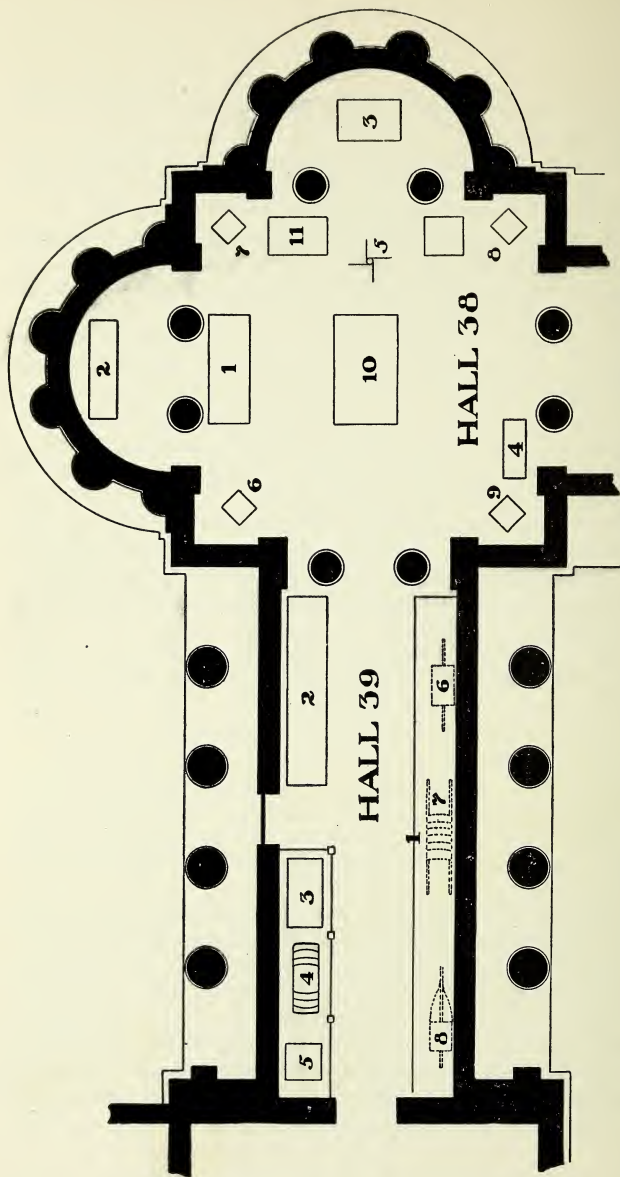
**No. 14.**—Corial (original), made by the Accawoi Indians, headwaters of the Demerara river, British Guiana, South America. This is the highest type of dugout canoe made by savages of any country, and is not patterned after the craft of any civilized race.

**No. 15.**—Tlo (original), a dugout for fishing purposes, made by the Bella Coola Indians, near Fort Wrangel, Alaska.

**No. 16.**—Dugout, with sail (original). Colon, Colombia, South America.

**No. 17.**—Surf canoe (original), with outrigger, Apia, Samoa. Used for general transportation and fishing where surf is heavy.

**No. 18.**—Woodskin (original), made by Accawoi Indians on headwaters of Rio Essequibo, British Guiana, South America the most primitive form of bark canoe.



PLAN OF HALLS 38 AND 39.

**No. 19.**—Birchbark (original) upper Yukon River, Alaska. The highest type of bark canoe made by savages is made by the Indians of North America.

**No. 20.**—Kyak (original), a decked skin boat used by Esquimo of America, Asia and Europe in hunting and fishing. Port Clarence, Alaska.

**No. 21.**—Caique (original) or row-boat; Constantinople, Turkey. A pleasure boat.

**No. 22.**—(Stand). Model of fishing boat of the type used on the Sea of Galilee in the time of Christ. The model was made in Syria.

**No. 23.**—Model of punt, or scow, used for ferrying and general transportation purposes in the harbor of Curacao, Dutch West Indies.

**No. 24.**—(Stand). Model of fishing boat used near Curacao, Dutch West Indies.

**No. 25.**—Venetian gondola for private use.

**No. 26.**—Daighsa (original). Locally called "Bumboat" by English sailors. Daighsas are used generally by Jewish merchants who peddle produce and fruits around Maltese harbors. Hence the inscription upon the seatback in the stern-sheets: "Heartily, wishing, all, sort, of, wealth, to, mankind, and, that, I, may, have, chance, to, live, honestly, with, same." Valetta, Malta.

**No. 27.**—Bragazza (original). A caravel-built, two-masted fishing vessel of Venice, Italy. The sails are artistically painted, showing the survival of ancient Phœnecian art influences among the Adriatic fishermen. On the foresail the inscription runs: "Peace to Thee, St. Mark, my Evangelist."

**On the North and South Walls** are hung pictures from the West Coast of South Africa, from Africa, Asia, and the United States—illustrating many primitive and other craft, including types of the highest development of wooden-bottomed American sailing vessels. In bas-relief are shown hulls of whaling vessels, also lithographs of whaling vessels surrounded by icebergs in the Arctic seas.

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### HALL 38.

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**Case 1.**—Models of steam tow boats with large tow of coal from Pittsburg to New Orleans. Secured through the Department

of Mines and Mining, World's Columbian Exposition. The steamer represented is 200 feet long, 42 feet wide, with cylinder 24 inches in diameter and 12 foot stroke of piston, and has seven boilers. The barges are each 130 feet long, 25 feet wide and  $7\frac{1}{2}$  feet deep, each carrying almost 13,000 bushels of coal. The steamer and tow, when running, occupy a space of 700 feet long and 150 feet wide.

Model of a raft of logs in the Mississippi River, being towed by the stern-wheel steamboat "Juniata." The steamer is hitched to the raft bow on and by means of guy-ropes run to the nearest corners of the tow, the steamboat is made to direct the course of the raft. The model of the steamboat is of metal. The model of the raft is made of white pine branches cut in Northern Wisconsin. Both boat and raft are constructed on  $\frac{1}{4}$  inch scale.

**Case 2.**—Models of river rafts and boats. The Jolly Boat—ferry boat of the Ganges. The Donga fishing and hunting boats. River trading boats from Malay Peninsula and China.

**Case 3.**—Ship barometer, log books, charts, chronometer, compasses and quadrants from old whaling vessels.

**Case 4.**—Wooden model of the "Santa Maria." A piece of wood from each exposition building (except concession stands) erected before May 1, 1893, in Jackson Park, is incorporated in this model, which is made to an exact scale.

**No. 5.**—Standard containing drawings, lithographs and prints of marine engines and experimental naval appliances. A letter to First Consul Napoleon of France from Robert Fulton, pertaining to plunging boats or masked batteries for use in the destruction of vessels in naval warfare, is shown here.

**No. 6.**—Statue of Robert Fulton.

**No. 7.**—Statue of John Ericsson.

**No. 8.**—Statue of Denis Papin.

**No. 9.**—Statue of man at the wheel, typical of marine transportation.

**Case 10.**—Experimental flying machine driven by compressed air. The machine was built by Lawrence Hargrave, of Stanwell Park, New South Wales, who has built eighteen experimental and successful flying machines, of which this is No. 14. An experimental test was made with this machine on March 31, 1892, and at a pressure of 250 pounds in the main tube, it flew 312 feet in nineteen seconds.

**No. 11.**—Models of double and single propellers for vessels; also, hull of tug boat.

**On the Walls** are hung a series of drawings, photographs and prints of the first propulsion by steam on water. Photographs of river, lake and ocean steamers, including relics of advertising posters in early days, form an interesting part of this exhibit.

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## HALL 39.

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### HUMAN BURTHEN BEARERS.

In the collection of Human Burthen Bearers are found life-size figures and models illustrating the primitive methods of transportation from widely diversified sections of the world, demonstrating the slow progress made in the manner of transporting goods and the wonderful endurance shown by the people of these countries.

**Case 1.**—Life-size figure representing street scenes in Constantinople, Turkey; street porters, transporting cases destined for the World's Columbian Exposition. Fire sergeant and original of fire extinguisher, chair carriers, and sedan chair of a wealthy Turkish lady. Water, milk and bread peddlers.

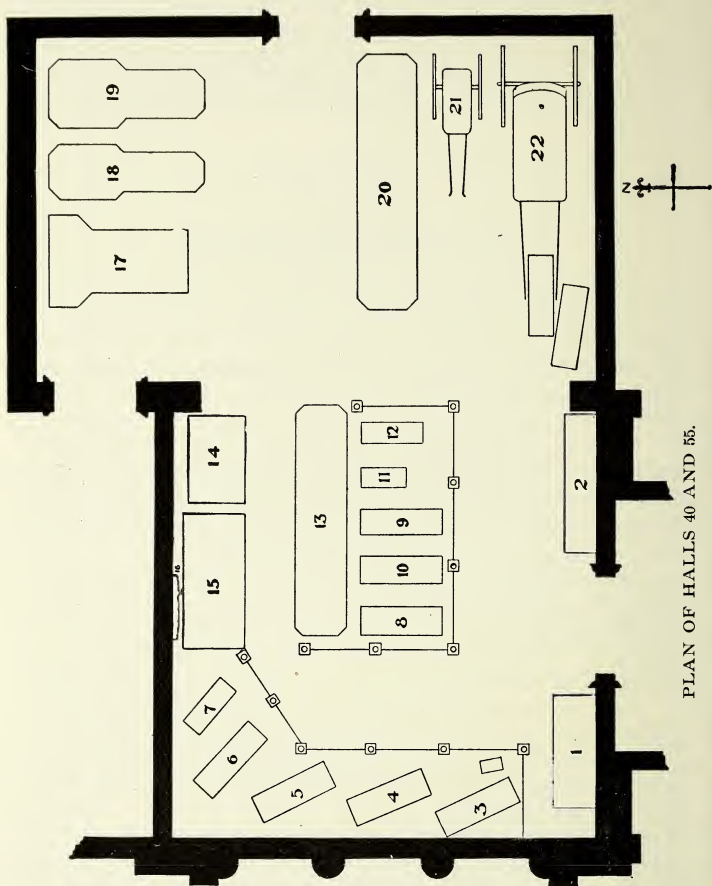
**Case 2.**—Life-size figures of burthen bearers from South America. Indian carrying a Silla, or traveling chair, in which is seated an American on his way over the mountains to Bogota, the capital of Columbia. Two Indian Cargadores, male and female, transporting goods from Guayaquil to Quito, capital of Ecuador.

**Case 3.**—Negro woman, life-size, representing the common method of carrying goods on the head in early slavery days in the southern part of the United States, also thirteen models of Cargadores, showing the different methods of transportation which prevail in Latin America.

**No. 4.**—The palanquin used by Mrs. French-Sheldon as a carriage, a boudoir and a drawing room during her explorations in eastern Africa.

**No. 5.**—Sedan chairs used by ladies of Bogota, Colombia, South America.

**No. 6.**—Phillipan, a primitive palanquin from Antananarivo, Madagascar.



PLAN OF HALLS 40 AND 55.

**No. 7.**—A Maxilla, or palanquin, from St. Paul de Loanda Angola, Africa.

**No. 8.**—Traveling hammock from Funchal, Island of Madeira.

On the walls are shown photographs and lithographs of burthen bearers and their methods of transportation, from various parts of the world.

## HALLS 40 AND 55.

### PACK ANIMALS.

Burthen bearing by animals is illustrated by a full series of pack animals and saddles. The animals equipped for the journey stand on the west side of and in the center of hall, and the saddles in a case opposite. Among the most interesting are the Syrian pack saddles on the camel; the pack saddle with bales, accompanied by Arriero, or mule driver of Bogota; the Lechera, or woman milk peddler, of Ecuador; and the Vaquero, or cattle herder, of Colombia, South America.

**Cases 1 and 2**—Show different stages in the development of pack and riding saddles. There are specimens of the primitive American pack saddle, with Esterias or plantain saddle pads; the skeleton saddle of the Cheyenne Indian warriors; three very handsome saddles from Latin-America, including one heavily ornamented with solid silver; and Mexican saddles. With these are various Turkish saddles; the beautiful gold embroidered one was formerly used by the Sultan of Turkey. Specimens of Asiatic harness are also shown.

**No. 3.**—Mule with pack saddle, from Bolivia, South America, loaded with two bales destined for the World's Columbian Exposition and accompanied by an Arriero, or mule driver.

**No. 4.**—Lechera or woman milk peddler, Ecuador, South America.

**No. 5.**—Vaquero or cattle herder, from Colombia, South America, equipped with twisted rawhide lariat and rope tether, and mounted on a mule.

**Case 6.**—Camel with pack saddle, showing method of transporting of merchandise across the deserts of Asia and Africa.

**No. 7.**—Donkeys carrying street peddlers, a common scene on the streets of Constantinople, Turkey.

**No. 8.**—Donkey with Syrian bridle and pack saddle, from Jerusalem.

**No. 9.**—Donkey with baker's pack saddle, from Constantinople, Turkey.

**No. 10.**—Burro, with rush saddle from Peru, South America, the most important beast of burthen in all Latin-American countries.

**No. 11.**—Burrito (or young burro), from Peru, South America.

**No. 12.**—Llama with blinds and panniers transporting portmanteaus over the mountains of Bolivia and Peru, South America.

**No. 13.**—Palanquin for passengers, transported by mules. A common mode of conveyance in the Orient.

On the walls are hung specimens of pack saddles, including a series of photographs of animal palanquins from Persia, and pack animals from various parts of the world.

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#### HALLS 54, 40 AND 55.

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### LAND VEHICLES.

In the collection of land vehicles are installed vehicles from widely separated portions of the earth. The most interesting are the sledges of sub-tropical Madeira, where snow never falls; the Scythian racing chariot, interesting in that it differs typically from the Assyrian chariot in the number of spokes; the rolling hogshead, a relic of early colonial days in the south; and the Mexican *carreta*, a cart with spokeless wheels. These illustrate the introduction of the wheeled vehicles into civilization. The Sicilian pleasure cart is adorned with religious decorations. The Turkish holiday wagon is in use both in European and Asiatic Turkey. The Cuban *volante* is hitched tandem, the leading horse being almost in front and a little to the left of the shaft horse. Here are also an interesting series of models of bullock carts and other native vehicles from India and Burmah; carts, wagons and carriages from Ceylon; carts and wagons drawn by man; elephant trappings, and vehicles illustrating native land transportation in the Malay

Peninsula, Java and Siam. Models of some American carts and horses are also shown.

**No. 14.**—Carro de Monte, or mountain sled from Funchal, Island of Madeira, made of willow and mahogany wood and finished in red cloth.

**No. 15.**—Carro de Boss, mountain sled with canopy, from Funchal, Island of Madeira, made of mahogany wood. Intended for four persons.

**No. 16.**—Corca, or freight sled, drawn by bullocks, from the Island of Madeira. Snow never falls at Madeira, but sleds are used as the steep, hilly streets of Funchal prevent the use of wheeled vehicles. The Carro de Monte, Carro de Boss, and Corca are the ordinary means of transportation in Madeira.

**No. 17.**—Replica of ancient Scythian racing chariot. This is an exact copy of the original found in an Egyptian tomb and now in the museum of Archaeology at Florence, Italy.

**No. 18.**—Sicilian holiday cart harness from Palermo, Island of Sicily, decorated with antique religious figures; used also in Naples and Southern Italy.

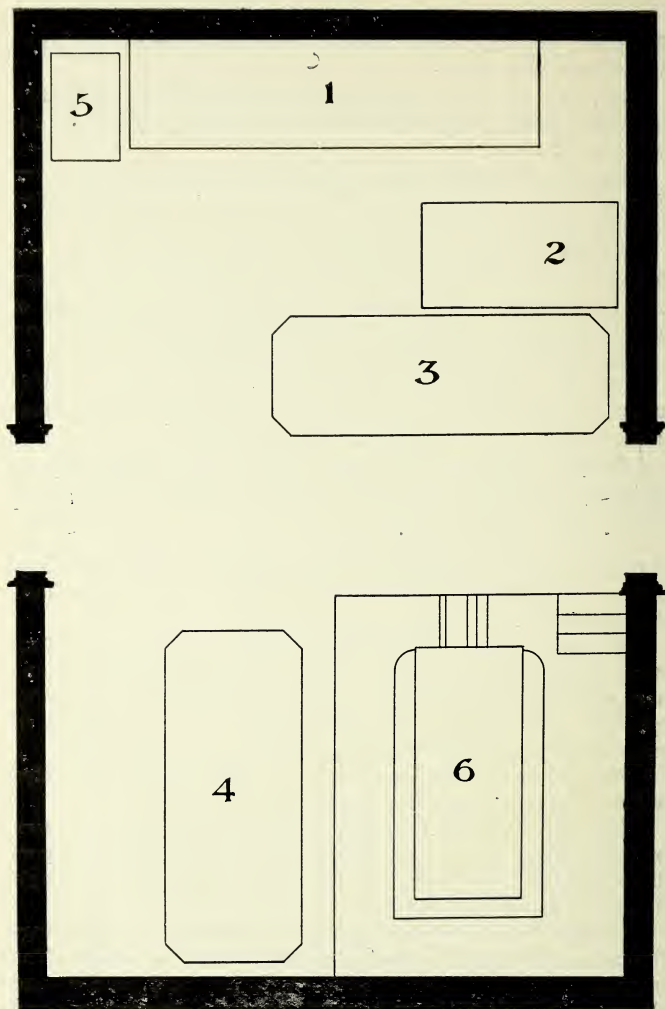
**No. 19.**—Red River cart and harnessed ox, the only method of transporting merchandise northwest of St. Paul, Minn., previous to 1871. In early days oxen only were used, but now ponies have displaced them.

**No. 20.**—Araba Codja, a country holiday carriage from Constantinople, Turkey, drawn by oxen. Their gaudy harness and hangings and bells make this a most picturesque and interesting specimen. The wagon contains no seats. The passengers sit cross-legged upon cushions placed at each side of the vehicle.

**No. 21.**—Norwegian cariole from Norway, originally exhibited at the Centennial Exposition, Philadelphia.

**No. 22.**—Volante, a carriage in common use in Cuba, drawn by two horses. A postilion rides the leader, and the passengers drive the shaft horse, using line and bit as customary with single horse vehicles.

**On the Walls** are photographs, lithographs and paintings illustrating the types of vehicles from all parts of the world. The interesting series of royal vehicles includes royal coaches and sleigh of the King of Bavaria; royal coaches of the sixteenth and seventeenth centuries; coaches of the Lord Mayor of London and Dublin, and of Pope Paul the 5th. Royal coaches from Japan;



PLAN OF HALL 54.



Russia and Portugal. The Shah of Persia's pleasure carriage, coach and his racing horses; also a series of Latin-American vehicles, including many from India, China and Burmah. A series of ancient Assyrian and Egyptian vehicles, types in use hundreds of years before the Christian era.

## HALL 54.

**Case 1.**—Models of vehicles from various parts of the world. Ceylon carts for freighting; Hindoo and Burmese wagons drawn by bullocks and horses, including a variety of Turkish wagons, and modern American horse and cart.

**No. 2.**—Ghurry cart, drawn by man, from Surat, India, largely used for transporting goods within the cities.

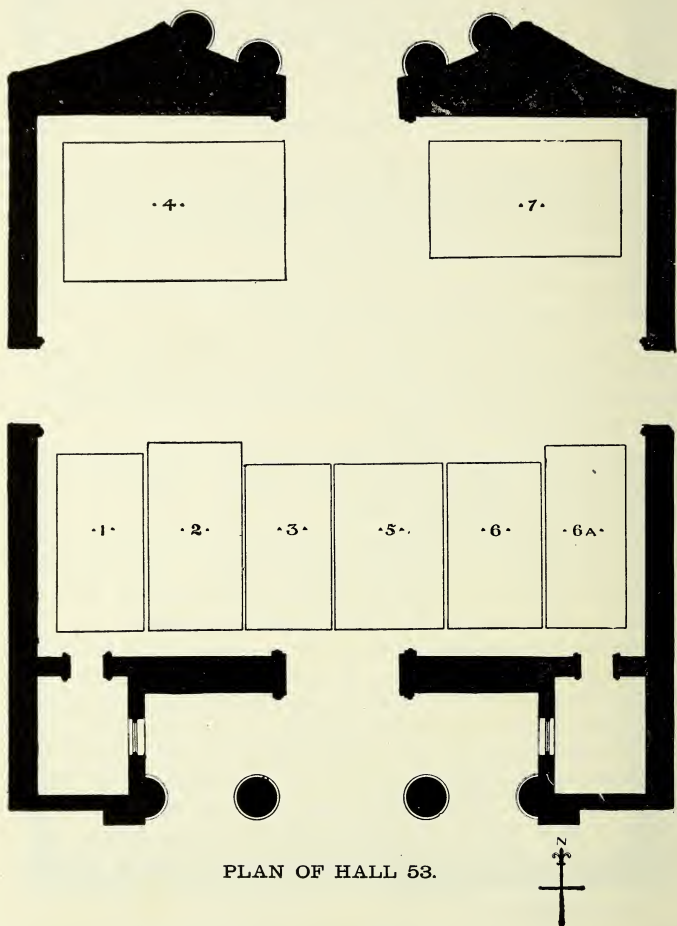
**No. 3.**—Rolling hogshead, with yoke of oxen and negro driver, illustrating the method in Virginia in colonial days of transporting tobacco from the plantation to the markets of Jamestown and Richmond, Virginia.

**No. 4.**—Carreta ox-cart wheels without spokes, made by the Indians of the Pueblo of Acoma, New Mexico, with oxen yoked according to the Mexican method.

**No. 5.**—Passenger wheelbarrow, Amoy, China, used to transport travelers from point to point within the city. The passenger places one foot across the front cross-bar, allowing the other to swing free, and resting the arm on top of wheel shield.

**No. 6.**—Represents a section of Clay street, San Francisco, California, in 1872. On this street was placed and operated the first cable railroad in the world. A section of the cable road, including yokes and rails, and the first grip-car run for public use on any cable street railway, are here shown. On the stands are specimens of the original yokes and the first original grip which was made for Mr. A. S. Hallidie, the inventor of the cable railway, 1872. A small model of the grip, together with models of cars, are also here. At the end of the stand are two yokes used on the cable railway of Germany.

**On the Walls** are a series of photographs of land vehicles, also a large drawing of Stephenson's first street car, together with photograph of street car lines in other countries.



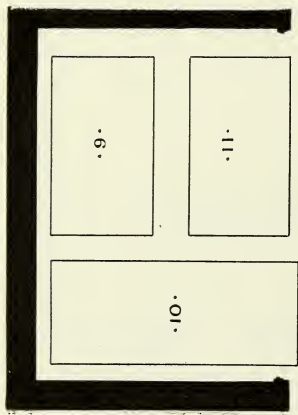
PLAN OF HALL 53.

## TRANSPORTATION BY STEAM.

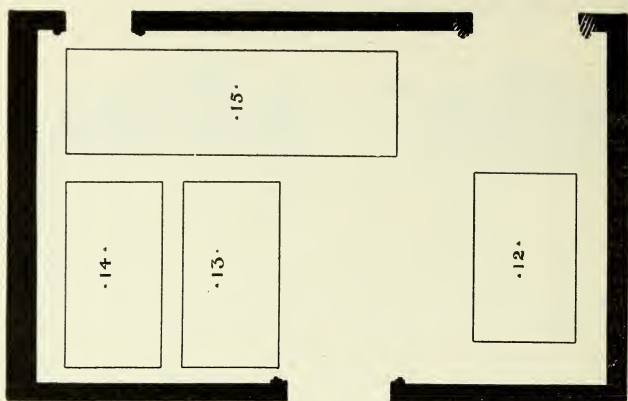
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This division of transportation, occupying the East Pavilion, is designed to illustrate, largely through full-sized reproductions and originals, the evolution and development of Permanent Way, Structures, Motive Power, Equipment and Appliances. The nucleus of this representation is in the extensive collection made by the Baltimore & Ohio Railroad Company for the Columbian Exposition, and purchased by the Field Columbian Museum. This collection embraces thirty-eight full-sized working reproductions, covering the period from the initial idea of steam propulsion on land, 1680, to the first "Camel" engine of 1848, and nine original locomotives, including examples of the practice followed from 1832 to 1876. In addition there are nearly eighteen hundred uniformly mounted and framed examples in original wash-drawings, detail plans, photographs, prints, and lithographs, illustrating the evolution and development of the railway in every land where the locomotive whistle has been heard.

The interesting collection made by the Pennsylvania Railroad Company for the Exposition is also in the Museum, and it tells in a graphic and instructive manner the story of the progress of this great railroad corporation by series of models and originals. The Baldwin Locomotive Works contributed the full-sized working reproduction of the "Old Ironsides," the first of the Baldwin engines, and the Rogers Locomotive Works the full-sized working reproduction of the "Sandusky," the first Rogers engine. The Philadelphia & Reading Company contributed the "Rocket," the original No. One on that road; the Illinois Central Company the "Mississippi," the original first locomotive in the Gulf States; the Chicago & Northwestern Company the "Pioneer," the original first locomotive west of Chicago, and the Mount Washington Railway the original engine, the "Peppersauce," the first mountain-climbing locomotive in the world. The World's Exposition, through the Chief of the Department of Transportation, presented to the Museum the "Samson" and the "Albion," the original first and second locomotives in Nova Scotia, together with the original first passenger car in that country and the two original first cars drawn on rails by a locomotive in the world, those from the Merthyr Tydvil tram road in South Wales.



PLAN OF HALL 52



PLAN OF HALL 51

In each instance the engines—the originals and reproductions—stand upon either the original or an exact counterpart of the track of their period.

It is suggested that visitors inspect the Halls in the order in which they are described, as in this manner evolution and development may be followed chronologically. On each original engine, as well as upon each reproduction, will be found cards affording much historical information.

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### HALL 53.

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**No. 1.**—Full size working reproduction of the “Newton,” England, 1680; the first idea of propulsion by steam on land in history.

**No. 2.**—Full size working reproduction from the measurements and detailed drawings made from the original in the Conservatoire des Arts et Metries, Paris, of the “Cugnot,” France, 1769; the first actual propulsion by steam on land in the world.

**No. 3.**—Full size working reproduction of the “Murdoch,” England, 1784; first propulsion by steam on land in Great Britain.

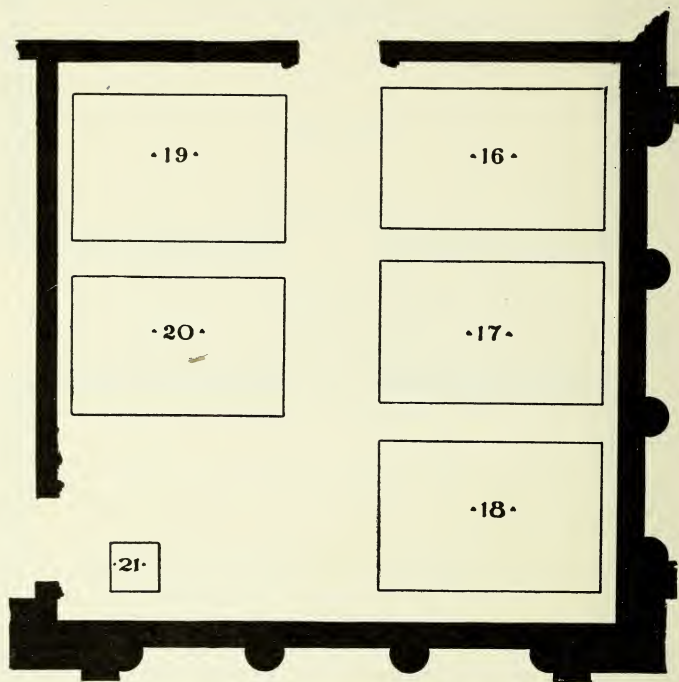
**No. 4.**—Full size working reproduction of the “Read,” America, 1790; the first idea of steam propulsion on land on the American continent.

**No. 5.**—Full size working reproduction of the “Trevithick,” England, 1800; the first effort of the father of the locomotive.

**No. 6.**—Full size working reproduction of the “Trevithick,” England, 1804; the first locomotive on rails in the world.

**Nos. 6A and B.**—In connection with this are two of the first five cars drawn by a locomotive in the world, they having been attached to the “Trevithick” of 1804, on the “Mythyr Tydvil” tram road in South Wales. These are the original cars in their original form, standing upon the original rails, which in turn are upon the original stones laid on the South Wales tram road in 1800.

**No. 7.**—Full size working reproduction of the “Trevithick,” 1808, the first locomotive on rails in England.



PLAN OF HALL 50.



**Upon the Walls**, series of original large wash-drawings, indicative of the early stages of the evolution of the locomotive. Also, series of original drawings by Theodore Cooper, showing the evolution and development of the railroad bridge of the world. Also, series of bromides of scenes on railroads in foreign countries.

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## HALL 52-

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**No. 8.**—Full size working reproduction of the “Evans,” America, 1804; the first actual propulsion by steam on land on the American continent, and the first practical propulsion by steam on land in the world.

**No. 9.**—Full size working reproduction of the “Blenkensop,” England, 1812; the first locomotive for actual commercial purposes in the world, it running on a rack road.

**No. 10.**—Full size working reproduction of the “Brunton,” England, 1813; the horse-leg locomotive.

**No. 11.**—Full size working reproduction of the “Hedley” model, England, 1813, with which the first practical demonstration of the adhesion of smooth wheels to smooth rails was made.

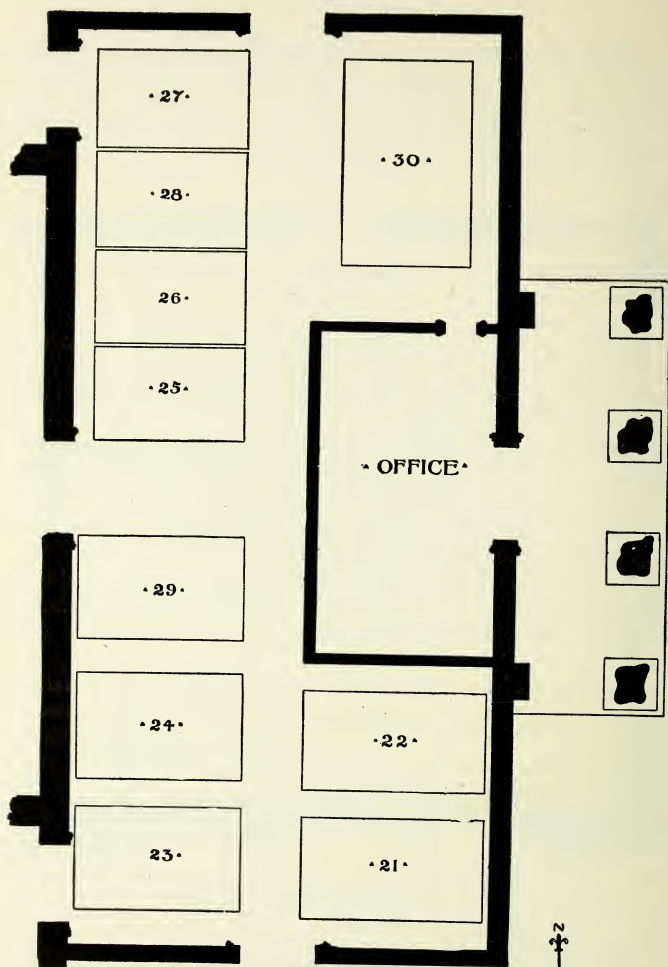
**On the Walls**, continuation of the Theodore Cooper series of the evolution and development of the railroad bridge; also a continuation of the large wash-drawings showing the evolution of the locomotive. Likewise, a further series of bromides of railroad views in foreign countries.

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## HALL 51.

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**No. 12.**—Full size working reproduction of the “Puffing Billy,” England, 1813, built by Hedley immediately after demonstrating the adhesion of smooth wheels, this locomotive being thus constructed. The “Puffing Billy” is from the measurements and drawings made by the authorities of the South



PLAN OF HALL 49,

Kensington Museum in London, the original engine, the oldest in the world, being preserved in that institution.

**No. 13.**—Full size working reproduction of the "Blucher," England, 1814; George Stephenson's first locomotive.

**No. 14.**—Full size working reproduction of the "Howard," America, 1828; the first locomotive patented in America.

**No. 15.**—Full size working reproduction of the "Seguin," France, 1827-28; the first locomotive in France, and the first locomotive in the world with a multi-tubular boiler.

**Upon the Walls**, concluding series of the Theodore Cooper drawings of the evolution and development of the railroad bridge. Also, series of large wash-drawings showing the evolution of the locomotive steam carriage period, and series of views illustrative of railroad operation in foreign countries.

## HALL 50.

**No. 16.**—Full size working reproduction of the "Rocket," England, 1829; George Stephenson's successful locomotive in the Rainhill trial, the first locomotive contest in the world, the reproduction being from the original drawings.

**No. 17.**—Full size working reproduction of Timothy Hackworth's "Sans Pareil," England, 1829; the first locomotive constructed with steam blast, and also a competitor in the Rainhill trial, the reproduction being from the measurements and detail drawings furnished by the South Kensington Museum. The original engine is in that institution.

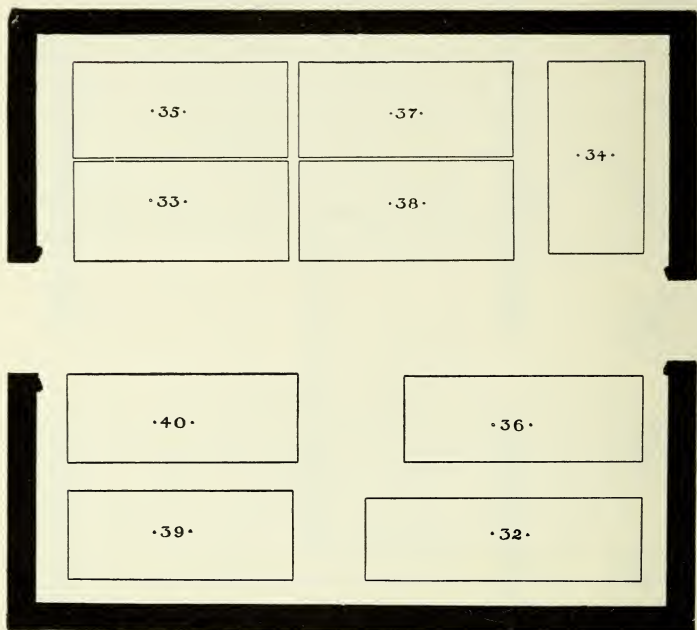
**No. 18.**—Full size working reproduction of Ericsson's "Novelty," England, 1829; the first tank locomotive, and also a competitor in the Rainhill trial.

These three reproductions stand upon the stones, rails and chairs of the original track upon which the trial took place.

**No. 19.**—Full size working reproduction of the "Stourbridge Lion," England, 1829; the first locomotive seen in America, having been imported the year named.

**No. 20.**—Full size working reproduction of Peter Cooper's "Tom Thumb," America, 1829-30; the first locomotive built on the American continent.

**No. 21.**—Statue of George Stephenson.



PLAN OF HALL 56.



**Upon the Walls.**—Continuation of the wash-drawings, showing the evolution of the locomotive of the world. Also continuation of the series of bromides, illustrating scenes on railroads in foreign countries, and a series of photographs showing modern bridges and railway appliances.

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#### HALL 49.

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**No. 21.**—Full size working reproduction of the "Best Friend," America, 1830; the first locomotive built on the American continent for actual service.

**No. 22.**—Full size working reproduction of the "Mercury," England, 1830; George Stephenson's highest type of development, and the father of the standard English engine.

**No. 23.**—Full size working reproduction of the original "York," America, 1831; Phineas Davis' first locomotive.

**No. 24.**—Full size working reproduction of the "Johnson," America, 1831; the first locomotive with a double firebox.

**No. 25.**—Full size working reproduction of the "James," America, 1831; the first suggestion of the link motion.

**No. 26.**—Full size working reproduction of the "Costell," America, 1831; first locomotive with oscillating cylinders.

**No. 27.**—Full size working reproduction of the "Child," America, 1831; first rotary locomotive.

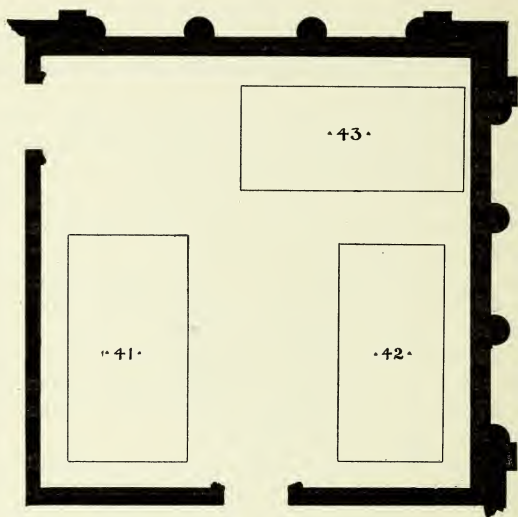
The five locomotives last mentioned were competitors in the Baltimore & Ohio locomotive competition or trial in 1831, the first event of this character on the American continent. The "York" was the winner.

**No. 28.**—Full size working reproduction of the "James" America, 1832; the first locomotive in the world with link motion.

**No. 29.**—Full size working reproduction of the remodeled "York," America, 1831; the first of the distinctively "Grasshopper" type.

**No. 30.**—Full size working reproduction of the "Old Ironsides," America, 1832; the first Baldwin locomotive.

**On the Walls,** photographs on canvas of Harper's Ferry, Buckhorn Wall, and Fairport; these photographic results being eight feet high and sixteen feet long. On the East, North and West walls of this room are a series of original drawings, litho-



PLAN OF HALL 48.



graphs, and photographs, illustrative of the development of the Baldwin locomotive from 1832 to 1893; On the walls in the Southern half of the room are a series of original drawings, lithographs and photographs, illustrating the progress as manufacturers of the Portland Locomotive Works, the New Jersey Locomotive Works and the Cooke Locomotive Works. Also series of maps showing the railroad occupation of the United States by decades from 1830 to 1890.

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### HALL 56.

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**No. 32.**—Full size working reproduction of the "South Carolina," America, 1832; the first double end locomotive in the world.

**No. 33.**—The "Atlantic," America, 1832; original engine, and the oldest locomotive in its original form on the American continent.

**No. 34.**—Full size working reproduction of the "Experiment," America, 1832; the first locomotive constructed in the world with the forward or "bogie" truck.

**No. 35.**—The "Traveller," America, 1833; original locomotive, and the first in the United States built expressly for freight purposes. This engine has a record of sixty years of actual service, a locomotive record without a parallel in history.

**No. 36.**—Full size working reproduction of the "Hercules," America, 1837; the first locomotive in the world with equalizing frame and levers.

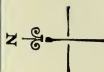
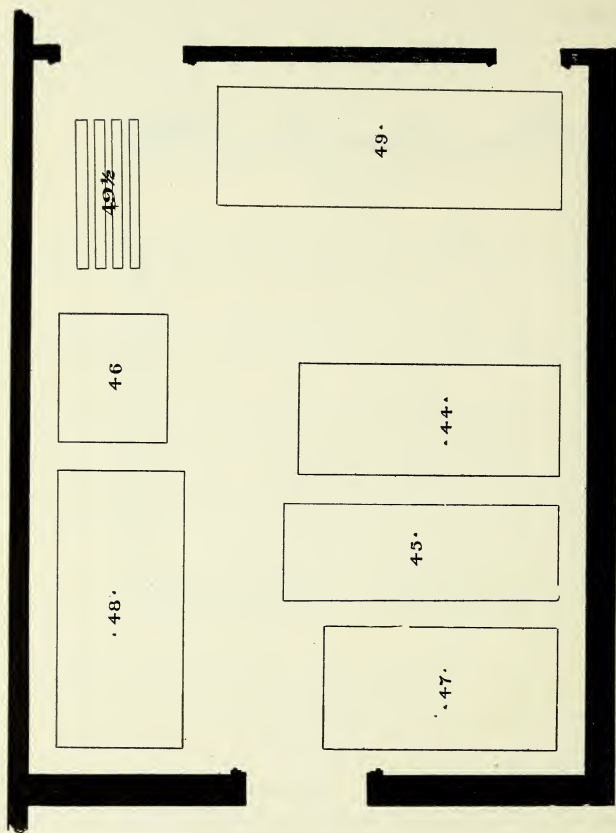
**No. 37.**—The "Thomas Jefferson," America, 1836; an original locomotive of the "Grasshopper" type, the first with cab for engineer and fireman, and the first Winans engine.

**No. 38.**—The "Mazeppa," America, 1837; original locomotive, and first of the "Crab" type.

**No. 39.**—Full size working reproduction of the "Campbell," America, 1836; the first or father of the American type of eight wheel passenger locomotive.

**No. 40.**—Full size working reproduction of the "La Fayette," America, 1837; the type of the first Norris locomotive with adhesion sufficient to surmount heavy grades.

**On the Walls.**—Photographs of the cities of Pittsburgh and



PLAN OF HALLS 46 AND 47.

Washington. A series of original wash-drawings, showing the development of the locomotives of the world and a series of bromides from direct photographs of English historical locomotives. Another series of drawings showing the evolution of locomotives and cars of the elevated railways. Also, a series of detail drawings of American and foreign locomotives.

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### HALL 48.

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**No. 41.**—Original locomotive, "Mississippi," built in Eng'and in 1834, imported to America in 1836, and the first locomotive in New Orleans, it standing upon a section of the original track.

**No. 42.**—Full size working reproduction of the "Sandusky," America, 1836; Rogers' first locomotive, and the first locomotive west of the Ohio River.

**No. 43.**—Original locomotive "Rocket," England, 1838; built by Braithwaite, London, and the first locomotive on the Philadelphia & Reading Railroad. Old "Number One."

**Upon the Walls.**—Original drawings, specifications, lithographs, and photographs, showing the development of the Rogers locomotive; also a series of large wash-drawings, showing the development of the locomotive of the world. Also, series of photographs of railway appliances.

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### DOUBLE HALL 46 AND 47.

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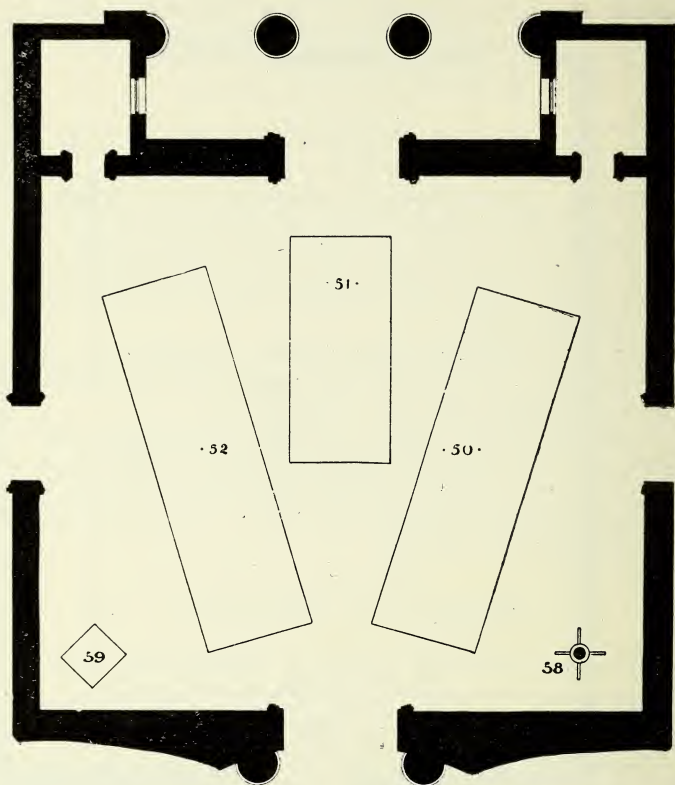
**No. 44.**—Original engine "Samson," England, 1838; built by Timothy Hackworth, and the first locomotive in Nova Scotia.

**No. 45.**—Original engine "Albion," England, 1839; built by Hackworth, and the second locomotive in Nova Scotia.

**No. 46.**—Original passenger car, England, 1831; sent with the "Samson" to Nova Scotia, the year named, and probably the oldest coach in its original form in existence.

**No. 47.**—Full size working reproduction of the "Buffalo," America, 1844; first locomotive in the world with 8 wheels coupled.

**No. 48.**—Full size working reproduction of the "Mount Clare," America, 1844; the first locomotive built by the Baltimore & Ohio



PLAN OF HALL 45.



Railroad at its own shops, and the heaviest locomotive of its time.

**No. 49.**—Full size working reproduction of the "Camel," America, 1848; the first of the heavy freight locomotives in America.

**No. 49½.**—Collection of railroad wood cross-ties, from all parts of the world, includes such wood as mahogany, iron bark, yellow wood, and red wood, some of which have been in service twenty-seven years, and are still serviceable.

**Upon the Wall,** large wash-drawings, showing the development of the locomotives of the world. Also, series of bromides of railroad scenes in remote countries. Also, series illustrating the development of railroad appliances. Another series of wash-drawings, showing the development of permanent way. Also, relief map of the United States, showing the railroad lines and principal transportation lines of the sea coast and great lakes.

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#### HALL 45.

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**No. 50.**—Original locomotive "Dragon," America, 1848; the first with rocking grate and the oldest Baldwin engine now existing.

**No. 51.**—Original locomotive "Pioneer," America, 1848; the first in Chicago.

**No. 52.**—Original locomotive "Mason," America, 1860; one of the earliest of the distinctive American model passenger engines.

**No. 58.**—Statue of James Watt.

**No. 59.**—Iron picture stand, containing photographs of railway car and appliances, by German manufacturers.

**Upon the Walls.**—The Westinghouse series of large original drawings, showing the evolution and development of the railway brake of the world. Another series shows the development of the Pullman sleeping car, and the Wagner sleeping car.

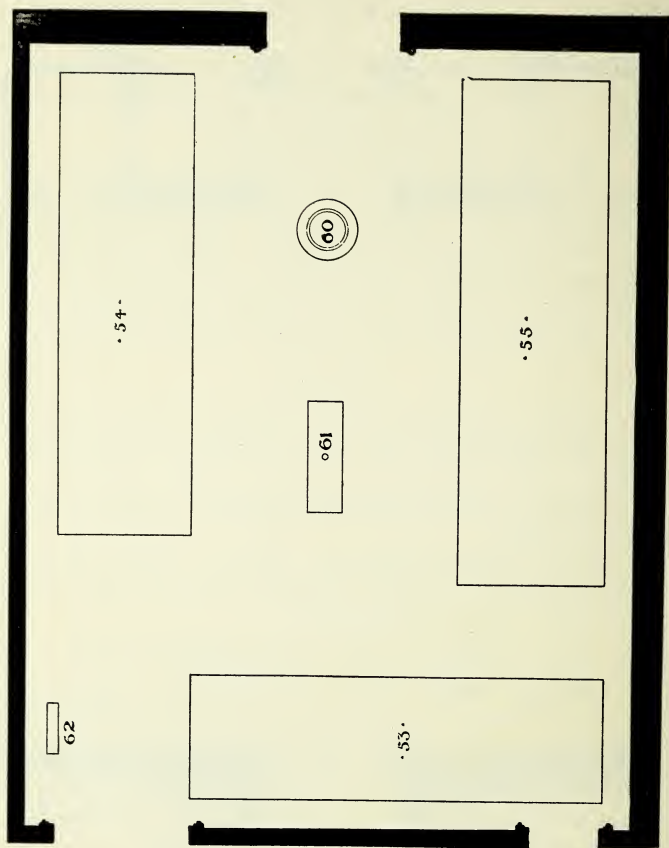
Series of original wash-drawings illustrating the evolution and development of permanent way, and photographs showing interior and exterior views of the royal trains of the world.

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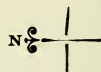
#### HALLS 43 AND 44.

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**No. 53.**—Original ten-wheel "Camel," locomotive, America, 1852; the first of this type of heavy engines.



PLAN OF HALLS 43 AND 44.



**No 54.**—Original locomotive, "Perkins," America, 1862; the first of the special type for climbing the heavy grade of the Allegheny Mountains.

**No. 55.**—Original locomotive No. "600," America, 1876; the first passenger mogul. This engine took an award at the Centennial Exposition, Philadelphia.

**No. 60.**—Original first chilled steel locomotive tires made in the world.

**No. 61.**—Collection of modern railway appliances and permanent way from different parts of Europe and America.

**On the Walls.**—Series of large original wash-drawings, showing the modern compound locomotives of the world. Series of original drawings and lithographs of historical engines, cars and appliances. Series illustrating development of the leading foreign manufactures of locomotive, cars and appliances. Series furnished by the German government, indicating the development of German motive power and equipment. The "West" series complete, consisting of fourteen plates, showing, in detail, the evolution and development of the English locomotive.

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## HALL 42.

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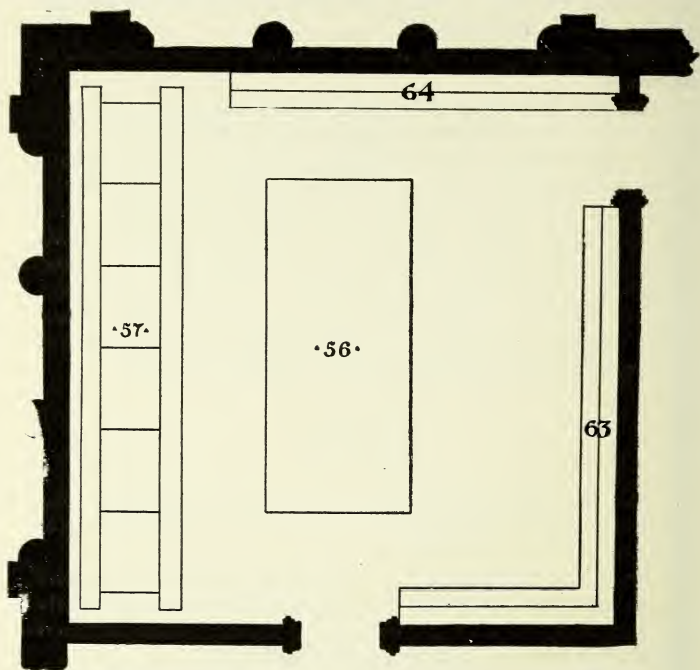
**No. 56.**—Original locomotive "Peppersauce," America, 1864; the first mountain-climbing locomotive in the world, standing on a section of the original track.

**No. 57.**—The original first iron railroad bridge ever erected on the American continent, it being substituted in 1839 for the wooden trestle-work on a crossing near Laurel, on the Baltimore & Ohio line between Baltimore and Washington.

**No. 63.**—On platform. Collection of modern railway appliances, permanent way, from Europe and America.

**No. 94.**—On shelves. Original cast iron tram rails, from Merthyr Tydfil Tram Road, South Wales, 1800. Cast iron edge rails, with frog, England, 1810. Loughborough edge rails, England, 1820. Old English plate rails, 1822. Original rails and chairs of Liverpool & Manchester Railway, England, on which the first locomotive competition in the world took place, 1829.

**On the Walls.**—Series of large, original wash-drawings, showing modern compound locomotives of the world. Series of



PLAN OF HALL 42.



original drawings, showing the development of American railway passenger and freight cars, by the Harlan & Hollingsworth Co. Series of photographs of drawing-room, sleeping and dining cars. Series of photographs and lithographs of railways throughout the world.

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#### HALL 41.

**Cases 1, 2, and 3.**—Containing samples of material tested by department of chemical and physical tests of the Pennsylvania Railroad Company.

**Case 4.**—Relics of early railroad days—lanterns, headlights, pieces of track, etc., etc.

**Case 5.**—Models showing early train signal and early block signals, together with rails, section of track system, switches, and frogs.

**No. 6.**—The original Saxby and Farmer interlocking switch. This is the earliest successful switch ever used in America.

**Stand 6A**—Relics of early rail joints, car springs, etc., etc.

**Stand 6B.**—Relics of early track appliances, etc., etc.

**No. 7.**—Original Camden & Amboy car, 1836, standing on the original block stone and the original rail of that period.

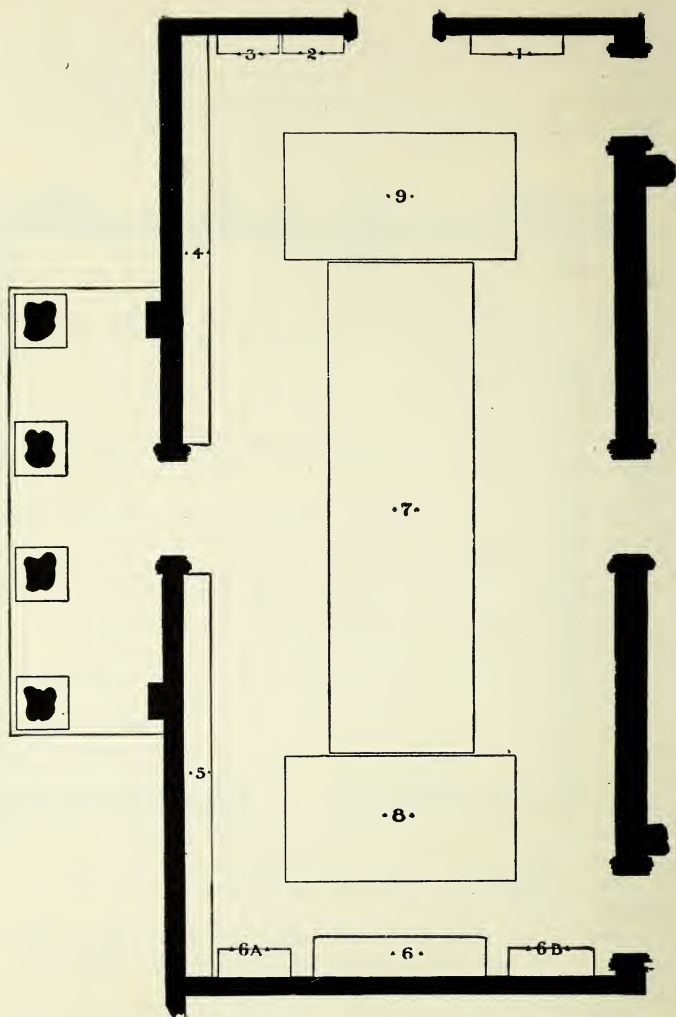
**No. 8.**—An original section of early wooden stringer and strap-rail construction, together with one of the original driving wheels of the "John Bull" locomotive, 1831, and wooden switch lever, with signal and cross, 1835; also a pair of cast iron wheels on axle, passenger equipment, 1846, and specimens of early railroad track.

**No. 9A.**—Section of original "T"-rail track, laid on original stone block and ties, Old Portage Railway.

**Nos. 9B and 9C.**—Two pair Camden & Amboy wooden passenger car wheels, 1848.

**No. 9D.**—Freight car wheel, with split-hub keyed to the axle. On the east side of the car are old rails, etc. On the west side are models of early railroad appliances.

**No. 9E.**—Collections of small sections of original rails from Amboy Div. Pennsylvania R. R. showing the development of the rail from 1831 to 1893.



PLAN OF HALL 41.



## HALL 57.

**Case 1.**—Models of the original "John Bull" and train, 1831. Model of the locomotive "John Stevens," 1825. Model of the locomotive "George Washington," the first locomotive to climb a heavy grade, built by Wm. Norris & Co., 1838. Model of the locomotive "Herald," the first on the Baltimore & Susquehanna Railroad, 1831. Model of the locomotive "Lancaster" and train, built by Baldwin, 1834. Model of passenger car "Victory," 1834. Model of ambulance car used during the war, 1862. Models of passenger and baggage cars Camden & Amboy Railroad, 1850. Model of car on Portage Railroad, 1835. Model of old car used between Rahway and Newark, 1833. Model of passenger car on Portage Railroad, 1834. Series of models showing the sectional canal boats transported on railroad trucks, 1839-1850. Model of machinery of Plane No. 7, Old Portage Railroad, 1835. Model of "Conestoga" wagon. Model of old stage coach, 1825.

**Case 2.**—Early publications and documents. Models of cars on J., M. & I. Road. Models showing modern freight cars for coal. Model of Madison plane, and rack-rail locomotive used on it 1850. Models showing modern rail, steam lighters, methods of unloading iron ore from vessels to rail, etc., etc. Statistical model showing the Pennsylvania Railroad system. Original of largest check ever drawn in an American railroad transaction.

**Case 3.**—Model showing the transfer of entire freight trains, New York Harbor.

**Case 4.**—Large model of the ferry-boat "Washington," running between Jersey City and New York.

**No. 5.**—Large model showing the rail crossings of the Alleghenies in the territory on which was located the Old Portage Road of 1832-1852, the New Portage Road of 1853, and the modern system of 1892.

**Case 6.**—Model of standard safety underground tunnel for passengers.

**Case 7.**—Relief map of Philadelphia terminals.

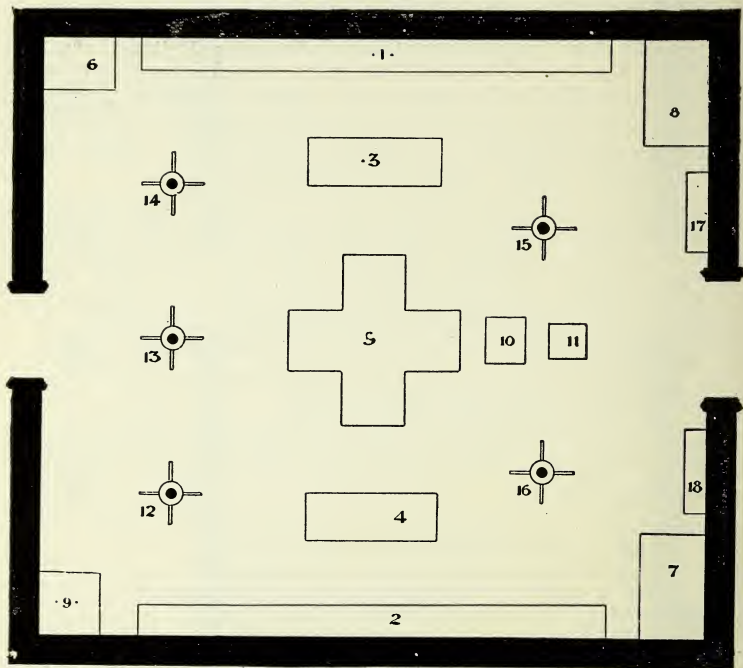
**Case 8.**—Relief map of Jersey City terminals.

**No. 9.**—Model of monument erected at Bordentown to commemorate first movement of steam in New Jersey.

**Case 10.**—Large globe model showing traffic of the Pennsylvania Railroad system.

**No. 11.**—Statue of J. Edgar Thompson, former president of the Pennsylvania Railroad.

**Nos. 12, 13, 14, 15, 16.**—Standards holding frames containing photographs of locomotives of the different types used on the Pennsylvania Railroad from its inception; also a series of maps showing the development of the Pennsylvania Railroad by decades. A series of views of the disastrous floods at Johnstown, Pa., and the great riot at Pittsburg, Pa., 1877, including a series of views covering the whole line of the Pennsylvania Railroad system. On the west walls, models of seals of corporations and chart of



PLAN OF HALL 57.



organization and badges of employes of the Pennsylvania Railroad Company. On the north wall is a large chart illustrating all trains in motion on the whole of the Pennsylvania Railroad system, at 6 o'clock P. M. Columbus time, each day.

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### EAST DOME. (HALL 58.)

**No. 1.**—Beneath the center of the dome a group of statuary, typical of the railroads.

**No. 2.**—Statue of Thomas A. Scott, a former president of the Pennsylvania Railroad Company.

**No. 3.**—Statue of Cornelius Vanderbilt.

**No. 4.**—Statue of John W. Garrett, a former president of the Baltimore & Ohio Railroad Company.

**No. 5.**—Statue of an old-time brakeman.

**No. 6.**—Large working model of the Consolidated Car Heating Company's system of heating cars.

**No. 7.**—Model of pontoon railway bridge across the Mississippi River at Prairie du Chien, Wisconsin.

**No. 8.**—Picture standard, containing views of Prussian railways and stations.

**Nos. 9, 10, 11 and 12.**—Models of early railway bridges planned and constructed by Benjamin H. Latrobe.

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## LIBRARY DEPARTMENT.

### HALLS 28, 29 AND 34.


The Library Department comprises the Library (Hall 29) and the Reading Room (Hall 28). The Library is designed for reference purposes only. It contains many valuable scientific and technical works which may be consulted by the general public. It is primarily for Curators and for those desiring to pursue special study or investigation on subjects treated in the Museum.

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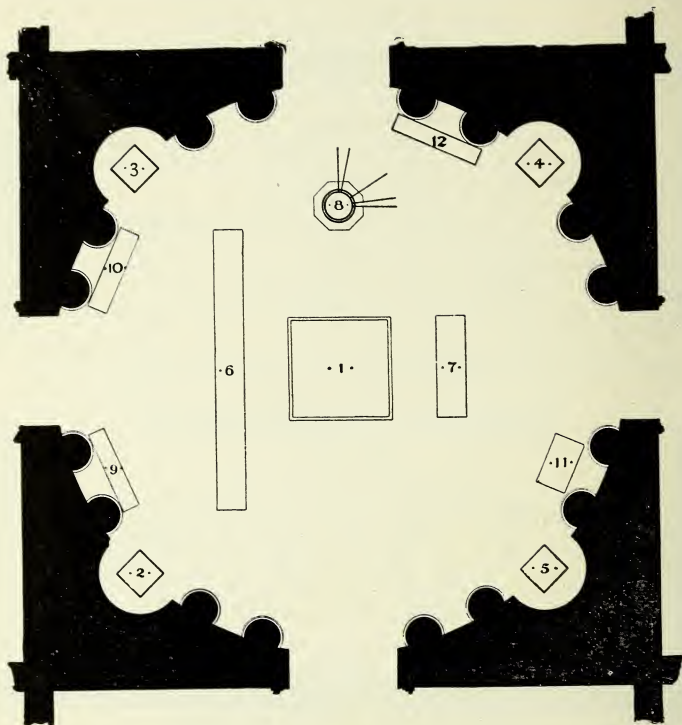
### HALLS 28 AND 29.

#### LIBRARY AND READING ROOM.

The collection of books and pamphlets on the shelves number approximately 22,000. It includes:

 The Kunz collection of works on minerals, gems and semi-precious stones, and containing many rare tomes on these subjects, in Latin, dating back to the 15th and 16th centuries.

The special library of the Department of Ethnology of the Exposition, formed by contributions to that Department from the



PLAN OF HALL 58.



authors themselves. A wide range of subjects is covered, and the Library is probably one of the best of its kind in this comparatively new science.

The Skiff collection, containing many valuable books of reference on minerals, mining and metallurgy. (This collection has been placed in the Departmental Library of the Department of Geology, West Annex.)

The collection of Russian works on forestry, presented by the Imperial Russian Commission to the World's Columbian Exposition.

The ornithological library purchased of C. B. Cory and containing the proceedings and transactions of the leading ornithological and zoological societies and the rare and standard reference books of the working ornithologist.

Upon the cases are the busts of the eminent scientists and naturalists: Geoffrey St. Hilaire, Galileo, Escalapius, Columbus, Cuvier, Agazziz, Humboldt, Huxley, Buffon, Hippocrates, Darwin and Linneus.

Departmental Libraries have been established in several departments of the Museum for working use by the Curators.

The Rules give information as to the privileges of the General Library.

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### LIBRARY RULES:

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1. The Library will be open every week day during the hours the Museum is open to the public.
2. The Library is merely a library of reference. The books are to be used in the reading rooms and not taken from them under any circumstances, excepting by the Curators and Assistants for use in Departmental Libraries.
3. Books may be obtained by filling out the application slip and presenting it at the desk. Before leaving the room the borrower will return the book or periodical to the desk.
4. Current periodicals may be consulted only in the Reading Room, and are not to be taken from the room.
5. Any book or periodical drawn from the General Library for Departmental Libraries, and required for immediate reference, will be sent for upon application to the Librarian, and temporarily returned to the General Library.
6. A set of encyclopedias, dictionaries and other general works of reference will be permanently retained in the General Library.

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In the Reading Room will be found the reading tables, which are supplied with current magazines and periodicals pertaining more particularly to scientific, technical and kindred subjects.

## HALL 34.

## LECTURE HALL.

This is reserved for all public meetings, lectures, etc., held in the Museum. Courses of popular lectures on travels, expeditions, investigations and on scientific and technical subjects are here given on Saturday afternoons of March and April, and October and November, by curators of the museum and prominent investigators and scientists. The lectures are usually illustrated with stereopticon views.

The semi-circular mural paintings on the sides of the room possess an intrinsic and historical value. The one on the north wall—a scene in Homeric Greece—is by Mr. F. D. Millet; the other illustrates a typical industry, that of pottery, and is by L. K. Earle. These paintings adorned the ceilings of the corner pavilions to the Manufactures Building, and were contributed by the Exposition to the Museum. On the west wall is a large equestrian picture of General Winfield Scott, while opposite it is one of General John A. Logan—the former loaned by Robert McCurdy, the latter by the Chicago Veteran Club. In the corners of the Hall are placed a heroic bust of Washington, presented by Susse Freres of Paris; a life-size statue of Edwin M. Stanton, Secretary of War in the Lincoln cabinet, and the stooping figure of a fawn—a fragment of a fountain—by R. P. Bringham, of St. Louis.

## THE OFFICES OF THE MUSEUM.

THE DIRECTOR—Southeast corner of South Court.

THE DEPARTMENT CURATORS:

ANTHROPOLOGY—Northeast corner of North Court.

PHYSICAL ANTHROPOLOGY—First Gallery of East Court

BOTANY—Second Gallery of North Court.

GEOLOGY—Southwest corner of West Annex.

ZOOLOGY—Second Gallery of South Court.

ORNITHOLOGY—Southwest corner of West Court.

THE LIBRARIAN—Northwest corner of North Court.

THE RECORDER—Southeast corner of South Court.

THE SUPERINTENDENT OF THE BUILDING—Southwest corner of South Court.



















